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The Farmer's Digest

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The Farmer's Digest

Volume 3 April, 1940 Number 12

Holland Builds a Masterpiece of Land Reclamation

Condensed from American Forests

W. C. Lowdermilk

WE are accustomed in the United States to the miracle of making desert lands blossom like gardens with irrigation waters, but Holland has achieved an unprecedented miracle in de-watering the ocean and transforming hundreds of thousands of acres of ocean floor into productive agricultural lands. A change requiring ages of time by geologic processes was accomplished by the Dutch engineers in only a few years.

The drama of this reclamation of the ocean floor, unfolded step by step, is fascinating. It is being finished ahead of schedule, complete in all its blue print specifications. And most wonderful of all, the able Dutch engineers, in spite of their fully settled and level country, were able to provide practically all of the enormous quantities of materials needed for many miles of huge dykes.

For almost a thousand years the Dutch engineers have been giving birth to small areas of new lands, but when these labor pains of the present Zuider Zee project are finally over, more than 550,000 additional acres, formerly inhabited by fish, will be occupied by people. Now the farmer actually plows the land over which the salt fisherman formerly plowed the waves.

Holland, once a part of Caesar's Gaul, is divided into two parts, namely, land above and land below high tide level. Forty-five per cent of her land lies below high tide level while a quarter is below mean sea level. Her land has been sinking at the rate of nearly four inches a century for the past 4,000 years. Holland is a land of alluvium, sands, silt, and clays eroded from the slopes and flanks of Germany, Switzerland and France, carried by the Rhine and Meuse Rivers, sorted, laid down, and spread out in a gulf of the North Sea, forming in times past great marshy delta flats and the ocean floor.

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The Dutch are indeed a great people, who can hold back the tides; filch agricultural lands from the bottom of the ocean, keep their rivers, laden with the silt and floods from two other countries, confined safely within dykes and flowing above the level of their agricultural lands. When erosion from other countries filled the canals with sand and endangered the dykes, these sands were turned into an asset and used commercially for extensive building programs. They expertly use locks to keep canals level and thereby avoid floods, regardless of excessive rainfall; for this purpose they early brought the picturesque old Dutch windmills to their assistance. I saw one of these masterpieces of engineering in stone and oak which had been in use for more than 200 years, still in splendid condition, fanning its weather beaten face with its long wooden arms and lifting twenty-five cubic feet of water per second into the canal above.

The transformation of the Zuider Zee began two hundred years ago, when a dreaming engineer declared it would be possible to dyke off the North Sea and turn a portion of the inland gulf into an ultimately sweet water storage lake, then to dyke off and to pump the water out of the remainder and reclaim the bottom of the sea for agriculture. Many doubting engineers decried the scheme, saying: "It can't be done." Several generations of engineers doubted, hoped and dreamed until finally this courageous project was fully worked out and found to be possible. For yet another generation the engineers discussed plans and details. In this they have had an advantage over the haste in which much of our work in the United States has been started.

Finally, a catastrophe hastened the passage of the bill to begin actual work in 1920, just as our disastrous dust storms of the southwest hastened the passing of the Soil Conservation Act of 1935 for our huge program of saving and reclaiming lands. A furious storm had broken the dykes of the Zuider Zee or inland gulf of the North Sea and flooded 32,000 acres of agricultural lands. Occurring at a time when the shortage of imported foods due to the World War was acute, this catastrophe emphasized the need for more land and put the long and carefully planned project into action.

Traveling over the picturesque elevated roads of Holland enroute to these new born lands, admiring the infinite panoramas of rural beauty and perfect adaptation of uses to the characteristics of the land, there seemed not a cubic foot of surplus earth to spare for more new dykes. The

roads were built from the excavations of canals and drainage ditches. Where could a small country like Holland obtain sufficient material to build miles of massive structures when her level land seemed not to have a molehill to remove? The $60,000,000 ocean dyke alone is twenty-six miles long and from ten to forty feet high and 200 feet wide, and the rushing waters scoured to a depth of ninety feet before the final opening was closed between the ocean and the gulf, requiring additional material to fill the gap. It was also necessary to enclose four "polders," or reclaimed areas of 550,000 acres with dykes of almost equal height. All this required many millions of cubic yards of material. Yet in the whole construction work, Holland provided as by a miracle all the material except a minimum of rock.

The Dutch engineers had solved these problems before work was begun. For several years they had taken more than 34,000 samples of the ocean floor. While the fish were still at play, the Dutch engineers knew just what portion of the ocean floor would produce wheat, truck crops, pasture, and forests, and on blue prints designated only unuseable portions for the new Yssel Lake, named after the beautiful Yssel River, north branch of the Rhine, which flows into it. This lake will ultimately become sweet water as the former salt water is gradually diluted by the rivers and tributaries flowing through it.

The sampling engineers found on the ocean floor, just outside the proposed dam, in the North Sea, great quantities of heavy, sticky impermeable material of glacial origin, called "boulder clay." Not far distant was found an abundance of fine sand. These two areas were attacked with a fleet of twenty-seven large dredgers, thirteen floating cranes and belt conveyors, 132 barges and eighty-eight tugs, and the North Sea was forced to disgorge into the construction of the ocean dyke alone some twenty million cubic yards of "boulder clay" and thirty-five million cubic yards of sand.

First, an artificial island was built up into the open sea, midway in the proposed twenty-six mile ocean dyke. Work proceeded in both directions simultaneously, from this island and from the mainland. Silt dams, made of mattress-like rafts, were loaded with rocks and sunk as a base for the dyke. Then the heavy sticky boulder clay was dumped on this from hopper barges by the opening of valves in the large bottoms, until the depth of the sea was less than six feet and then from plain barges by means of floating cranes with grab buckets. Behind

this mass of impermeable "boulder clay," sands from the floor of the sea were piled up to give width to the dyke and support to the clay facing. The sands were unloaded by grab buckets or disgorged directly from the large pipes of great suction dredges. Then the inner side of the dam was faced with "boulder clay" and finally both sides were covered with basalt rock above and brushwood mattresses below the water line, thus affording a completely adequate protection against storm tides.

The Dutch engineers left nothing to chance; everything had been worked out with precision for the final struggle with the treacherous invading ocean in closing the last three openings of 9,000 feet. The great Dutch physicist, Lorenze, in his hydraulic laboratory, worked out precise calculations of tidal change and the effect of the flow of water on the dykes. As the enclosing dam grew and neared completion the openings left for the passage of tidal waters became narrower and the velocity of the tidal flow was correspondingly greater. A veritable armada of ships containing material was assembled for the finish, and though at one moment, the force of the outward current scoured the small remaining opening to a depth of ninety feet, the last aperture was successfully closed on May 28, 1932, a full year ahead of schedule. A great assemblage of tugs, dredgers, steam cranes, all hooting deliriously, voiced their congratulations together with the human cheers of royalty, of high officials, and of all who could gather to celebrate Holland's triumphant victory after a thousand years of conflict with her invading enemy, the North Sea.

When completed, this enclosing dam was provided with room for a double track railway, a fine forty foot motor road with separate paths for cyclists and pedestrians. In this dam are twenty-five sluices with steel tidal gates, traveling up and down between reinforced concrete towers, closing at high tide to prevent salt waters from entering the lake and opening at low tide to permit the emptying of accumulated river waters. Spare gates are also provided for emergency. In this mass of concrete are built ship locks, to enable freight to go in and out through the North Sea.

The western portion of the ocean dyke was finished first to join the Island of Wieringen, then an inner dyke was completed to enclose the Wieringermeer "polder" of 48,000 acres. This basin was de-watered and de-salted and became the experimental area during the construction of the main ocean dyke. To empty these 48,000 acres of salt water, thir-

teen to sixteen feet in depth, the picturesque, efficient but slow Dutch windmill was discarded. Instead, two huge pumping stations, one driven by electric power with a capacity of 260,000 gallons per minute and the other with Diesel engine power with a capacity of 120,000 gallons per minute, using different fuels as a precautionary measure, sucked up the 48,000 acres of salt water and dumped it back into the North Sea in a record breaking time of six and a half months.

Now, onto this new "polder" came a marvelous synchronization and coordination of engineers, agricultural specialists, such as soil scientists, foresters, architects, builders, contractors, masons, town planning experts, transportation engineers; in fact, every kind of specialist needed suddenly to bring forth from blue prints, new towns, producing housing conditions such as one would expect one hundred years hence, and ultra modern farms and barns to make a farmer's fondest dreams come true.

Before this first vast basin of water was entirely emptied power machinery, built for this purpose, had marked off with mathematical precision, each new farm in elongated sizes from 50 to 160 acres according to land use, as prescribed by the sampling of soil scientists, who had laid off dairy ranches, truck gardens, grain farms, sugar beet farms, communal forests, all according to the character of the "soils" of the ocean floor. No fences or boundaries were necessary because drainage ditches or moats separate each farm on the long sides. Barge canals bound each farm on the narrow rear end and connect with the large freight transportation canals to the ocean or up the lake. All the material scooped up from these channels had been dumped on specified lines to form a net work of elevated paved roads, with hidden electric and telephone wires, which radiated out from the commercial centers to electrify every farm and to form the boundary at the opposite end from the barge canal, thus giving complete water and motor transportation facilities for every farm.

This new army of occupation divided itself into units. A division of masons constructed concrete movable bridges over the large canals and stationary bridges over the barge canals in connection with these excellent elevated paved roads. Architects, carpenters and masons, combined their best efforts to build huge, ultra modern barns, architecturally a part of the house, of materials and design to last for centuries. Besides electricity and telephones for each home, small wells were dug into the peat and

sealed to accumulate marsh gas, which was piped to kitchens for cooking purposes. The only deficiency from our viewpoint was that bathroom equipment was left for individual farmers to install when and if they wished, instead of being a part of the initial building plan. Homes were always placed at some distance from the road to allow for the beautiful flower gardens for which the Dutch are far-famed.

Meantime, armies of architects, masons, carpenters, plasterers, attacked the problem of erecting the blue print model, full grown towns, with homes and hotels, schools and churches, recreation and business buildings, all of harmonious designs, in delightful combinations of brick, tile and window panes, making buildings fairly radiant with light and air. Nothing was crowded, all homes had their gardens, and happy generations to come will thank these ancestors for providing ample parking space for future automobiles, regardless of size and number.

The building programs were simple compared with the task confronting the agricultural engineers. The "soil" of the ocean floor had the same salt content as the ocean water. First, huge power plows turned over the ocean floor to expose it to rains. Drainage ditches hastened rain percolation and leaching processes. The average rainfall is twenty-eight inches annually, of which sixteen inches is evaporated, leaving about twelve inches to do the de-salting. It was astounding that in one year, a rye crop could be grown on the sandy "soils," but the clay "soils" contained up to four times the total amount of salt of sandy soils and required two to three years of fresh water percolation, to leach out salts sufficiently for the growth of vegetation.

Wind and water erosion on the floor of the North Sea began as soon as it was exposed without cover, to the winds and rains; whereas centuries of ebb and flow of tides had caused little erosion. The poorer sandy soils, unsuitable for agricultural crops, were set aside for communal forests. On these lands wind erosion started almost immediately. The foresters rushed millions of trees and shrubs, some twenty species tested for these soils, on to the exposed areas. The cottonwood and alder produced the most rapid growths. The communal forests serve a four-fold purpose; they prevent the menace of wind erosion on poor lands to surrounding farms. They furnish the inhabitants with timber and fuel in continuous supply through controlled cutting. The income from such sales will reduce taxes for district administration. The forests already provide recreation

areas which game specialists have already stocked with Chinese pheasants, rabbits and other edible game.

Experts rushed the land into cultivation by tested formulae of rotations, fertilizers and cropping, until there was sufficient lime, phosphates, potassium, and nitrogen to grow crops of wheat, barley, rye, pasture, sugar beets, potatoes, cabbage and other crops. After three years of preliminary nursing by experts, the farms are sown to alfalfa or clover. When the land is fully covered by this crop, it is ready to be weaned, and to be turned over to individual farmers for cultivation of crops.

When all four sections are completed, there will be many thousands of completely modern farms, sufficient to support three hundred thousand persons on farms and in local town activities, and all this at thirteen to sixteen or more feet below the level of the ocean.

Entrance to this agricultural heaven is closely guarded. Only a select few—thus far an average of one in thirty seeking admittance—are able to meet the entrance requirements. A land manager passes on all applicants for admission, whether farmers, doctors, veterinarians, and all who serve the farmers. First, past records and qualifications must prove farmers worthy of this stewardship of the land. They must have good character, be of good family and have sufficient capital to stock the farm and buy machinery. They must set up housekeeping in the model house with attractive furniture and fittings. They must have financial backing to carry them over a possible crop failure. If money must be borrowed, it must be from a relative and not from a bank, on the assumption that the former would be more lenient. It is not intended that farms fall into the control of financial interests or bankers. Rent of $12 an acre is paid annually to the government, increasing to a maximum of $21.60 an acre as production increases. All town buildings, public and private, are also rented. When this project has returned to the government the initial expenditure, it may then be possible for farmers to obtain complete ownership.

All farmers are on probation for six years. Technical advice, which the farmer may use or not as he wishes, is furnished free. But at the end of six years he must give an accounting of his stewardship of the land. If he is found wanting in the use of the land, he is cast out and his opportunity is taken from him and given to one more worthy.

The gains of this type of "conquest," which the Dutch jokingly speak of as their "Imperialism,"

cannot be fully evaluated so soon, for they are national assets of inestimable value for generations to come. The first gain to Holland is the addition of 550,000 acres of fertile lands in a small, definitely agricultural country. Second, the danger of inundations and loss of life and property is over. Instead of the former upkeep of 200 miles of dangerous ocean dykes, against which north winds from the Arctic piled up storm waters far beyond high tide levels, there are only twenty-six miles of practically indestructible ocean dyke. Third, at last Holland will have a much needed, huge, sweetwater storage lake, for supplying irrigation and drinking waters for new and old areas, valued at well over eighty million dollars. This lake will eliminate also a two million dollar annual cost of maintaining a constant canal level for transportation and also prevent future losses from droughts in the two provinces of North Holland and Friesland. Fourth, instead of the long and circuitous routes from commercial centers, this ocean dyke brings speedy communication between Amsterdam, Rotterdam and the Hague.

The other gain, which cannot be computed in dollars and cents, is the satisfaction and stimulus to the Dutch in the accomplishment of a difficult and worthy task well done. Thousands have rejoiced in the privilege of working to create this national asset for present and future generations. The entire country appears to be a well regulated, prosperous and happy household, content to stay at home, with honest pride in its beauty, its products, artists, engineers, and its accomplishments, —truly an example and inspiration to all other nations for the development and conservation of their own potential materials and human resources.

Holland has chosen the better way. If civilization is to be saved, nations must find other solutions than war. When all methods of mass destruction of life and property are in the hands of every nation, war becomes national suicide. All continents are occupied, there are no new lands to colonize. Conservation rather than conquest is the solution to needs of nations. The Dutch have fought and won new lands, not from other peoples but from the soulless sea. The cost is less than a war of aggression.

General Principles of Plant Disease Control

Condensed from Texas Farming and Citriculture

G. H. Godfrey

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THERE are two general types of plant diseases, (1) those caused by non-parasitic agencies such as poor nutrition and (2) the true parasitic diseases. Remedies for the first class consist of overcoming the particular condition that is responsible for the disease: High water table and excess salts in soil may be corrected by drainage; tying up of needed elements in the soil because of too much alkalinity, with a resulting yellowing of the foliage, may be remedied by making the soil more acid by application of sulfur or other acid-forming material to the soil.

Parasitic diseases are caused by actual penetration of the plant tissues by some parasite, which may be a bacterium, a fungus, or a nematode. For such a disease to occur, three conditions must be present, namely (1) the organism responsible for the disease, (2) a favorable environment and (3) a susceptible plant. The disease may be kept under control by controlling any one of the three factors.

Presence of the organism: Let us consider our cabbage black rot problem. This disease can be controlled by seed treatment. The treatment simply eliminates the causal bacterium from the picture by killing it out even before the seed is planted. The cabbage may be ever so susceptible, and the soil and weather conditions favorable to infection, but the disease will not occur, simply because the parasitic organism is not present. (Unless, of course, infection takes place in the field from bacteria left in the soil from last year's diseased crop.)

Citrus canker, one of the most serious of citrus diseases, was controlled permanently in Florida by eradication of all trees that showed the disease. Citrus in that state is now free from the disease because the disease organism is no longer present.

Next—favorable environment: Potato late blight did not occur in the Valley during the 1939 spring season. Why? The seed potatoes came from the same source as always and, undoubtedly, the disease was present in some of them. The disease did not occur simply because of the period of dry weather that occurred continuously while the plants were young and highly suscepti-

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ble to primary infections. When a brief period of favorable weather did come along later, the plant stems and lower leaves were hardened and infection could not take place up to the surface of the soil.

Let's look at the year before, when blight did occur. The organism was present, the plants were susceptible, the environment (all factors of weather conditions) was favorable. Fields left to themselves became heavily infected and in some cases wiped out, with no crop at all because of the disease.

But those growers who practiced spraying or dusting to control the disease and who applied it in time, created an artificial environment that was unfavorable to the disease. They coated the leaves, top and bottom, with a thin film of copper compound that is poisonous to the organism. The copper compound has to be insoluble—otherwise, it would injure the leaves. According to one theory those fungus spores that are present, in the process of germination and growth, secrete a mild organic acid. This acid is sufficient to dissolve some of the copper, and the copper in solution then kills the spores. In other words the spores commit suicide in the very act of germination!

This is the general principle used in the application of most fungicidal sprays and dusts—the method most commonly used in the control of parasitic plant disease.

Third—the matter of susceptible varieties: All the other conditions being equal and favorable for the occurence of disease, the susceptibility of the plant to disease is the factor that determines whether or not disease will occur. The potato will not take carrot blight simply because it is not susceptible to it under any circumstance. Neither will the cucumber take potato blight.

Fortunately, there are even differences in susceptibility within a plant species. Bonny Best tomato is highly susceptible to the fungus, Fusarium, that causes tomato wilt. The Rutgers variety is highly resistant to this fungus, due to some internal condition of the root, and will not become nearly as badly diseased as the other. The white Bermuda onion is highly susceptible to a disease known as "neck rot." A red-skinned Bermuda onion is entirely immune to it, owing to the very presence of the red pigment in the onion skin, which is toxic to the fungus. Sour orange roots are highly resistant to the cotton root rot fungus. Grapefruit roots are not. That is one of the reasons why grapefruit tops are budded onto sour orange roots—to escape damage from root rot disease.

So man has made use of this

principle—differences in disease susceptibility, as a means of controlling plant disease, and has created by many years of selection and breeding many new varieties of plants that resist the diseases to which the more susceptible sorts are subject.

Therefore, when it comes to the problems of parasitic-disease control, the plant pathologist uses one or more of the three principles:

(1) Eliminating the organism by seed or plant treatment; or excluding it by plant quarantine.

(2) Planting under environmental conditions not favorable to the disease or creating an environment that is unfavorable for the disease organism, by spraying or dusting, by soil treatment, or other artificial means.

(3) The selection or development of disease resistant varieties.

Spraying and dusting are the means most commonly followed for plant disease control.

Compounds of copper are most common ingredients of fungicidal sprays and dusts. In fact, the very first spray used, a mixture of copper sulfate and lime, was applied to grapes at Bordeaux, France, in the 1880's primarily for the purpose of keeping off the vines a special type of pest—the neighborhood small boys! The boys were afraid the fruit would be poison and left it alone. Purely secondarily, it was noticed by the grower that the plants so treated gave a good crop of grapes. Plants not so treated were badly blighted. The destructive grape mildew was controlled. This was the way Bordeaux mixture originated, and this marked the origin of plant spraying for disease control.

In the matter of spraying, a great deal of progress has been made in recent years. Materials have been improved. Instead of the old crystals of bluestone, which require hours to dissolve, we are now using a finely ground bluestone that dissolves in a few minutes. A finely powdered hydrated lime is now being used more than the rock lime which first has to be slaked and carefully screened to avoid coarse particles. The old formula of equal parts of bluestone (4-4-50 or 5-5-50) has been changed. Now a much lower lime content is used. However, if too little lime is used, there will be present some copper in solution, which is injurious to most plants. A 5-1½-50 Bordeaux was found to be perfectly safe, and last year this was the most effective of all materials in controlling potato blight. Unless *fresh* hydrated lime is available, I would prefer to recommend a 5-2-50 Bordeaux as more uniformly safe. A still further improvement lies in the use of insoluble copper compounds which

are completely safe and very effective. Red copper oxide, copper oxychloride, and basic copper sulfates are examples.

The recently developed power spray machines are much better than the old. The need for high pressure is recognized. Three hundred pounds per square inch pressure has given much better coverage of plant parts and better disease control than 200 pounds; 400 pounds gave better control than 300 pounds. It is not necessary to go above this pressure for most row crops at least. Too high pressures mean more wear and tear on the pump machinery; more rapid delivery of the liquid than is usually needed, with consequent increased cost for spray materials; and much more rapid wear on spray nozzles and disks. We have seen the disk hole doubled in size by the wear of one day's operation at 600 lbs. pressure, which meant much greater loss of liquid by dripping, and less efficient coverage than when the correct size of nozzle opening was maintained.

It must be remembered that for most foliage diseases of plants, top surface coverage alone is not enough. The bottom surface must also be protected. The better power machines have three nozzles to the row—one spraying down from directly over the plant row, and one low down on either side directly inward and even slightly upward. The intermingling of the fine mist sprays from the three nozzles on each row of plants results in thorough wetting of the plants from all sides. This is the real value of an effcient power spraying machine. Even with the smaller outfits, an approach to this degree of efficiency can be obtained. However, one can not hope to attain the quality of control with small hand sprays that he can with the larger power machines.

Dusts: Fungicidal dusts, while generally considered not as efficient as sprays for disease control, nevertheless are making a good showing for themselves. Practically the same materials as those used in sprays are used. If efficiently applied, they should, theoretically, be just as efficient. The trouble is that most dusting machines were developed primarily for the application of poisons for leaf-eating insects, and top surface coverage alone is generally sufficient for these pests. The important feature of under surface coverage of foliage has been overlooked in most machines. The best results are to be obtained if applications are made at night or early in the morning, on dew-covered leaves. A delivery tube that will make a cloud of dust rise through the plant, then settle down from above, is the ideal to be sought for. Upper surface coverage alone is not suffi-

cient for applications of fungicides.

Airplane dusting: Some remarkably good results have been obtained from airplane dusting. The dust cloud forced downward from the plane on a still dewy morning should strike the ground, then rise through the plants and give excellent coverage. There is room for considerable improvement in this respect in most dusting observed by the writer. The usual fault is uneven coverage. There is often to be seen a heavy blanket of dust directly beneath the line of flight, with inadequate coverage in the middles between the lines of flight. Some machines obtain the best all round coverage in a strip several feet wide at the border of the line of flight, where a rolling motion in the dust cloud makes good contact on the under surfaces of the leaves.

A full 20 pounds per acre of fungicidal dust should usually be applied. Less than that (12 or 15 pounds) is perhaps sufficient on young plants of such crops as potatoes or tomatoes, provided it is evenly applied.

Millions of Little Fishes

Condensed from People and Places

WHEN, in 1877, Rear Admiral Daniel Ammen, USN, brought a few goldfish from the Orient he little realized he was planting the seed for a new world-wide industry. For that matter, neither did Eugene C. Shireman who, 22 years later, fell heir to a swampy farm a mile or so north of Martinsville, Indiana. Nor did Shireman's friend, who conceived the idea of pushing sales of his washing powder by offering a bowl of goldfish as a premium.

But the happy combination of circumstances brought into being the world's largest gold fishery and water gardens—Grassyfork Fisheries at Martinsville.

When the premium scheme clicked so well that the chemical company ran out of fish, Shireman decided to convert his swamp into a fish farm and sell his crop to the company. He began with 200 wigglers but before Shireman could "harvest" his first crop his prospective customer failed. However, other organizations took to the premium idea and Shireman's goldfish helped swell the sales of a score of products.

Today, Grassyfork—now covering 1500 acres, including 645 ponds—is a highly specialized, mass-production, million-dollar-a-year business in which scientific research has been a paramount factor. It gives employment to hundreds, provides an entertain-

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ing mecca for some 300,000 visitors annually. Its products, goldfish and waterflowers—some of the finest water lilies and rare plants for garden pools come from here, too—are shipped all over the world.

Special breeding pools, lined with rectangular frames containing nests of Spanish moss, are the starting points of goldfish farming. The eggs—females sometimes lay as many as 75,000 in a season—adhere to the moss like miniature pearls. When firmly attached to their "bed," the frames are transferred to hatching tanks where about 60 percent of the eggs hatch into microscopic fry no larger than mosquito larvae.

The Grassyfork feed bill runs about $75,000 yearly. During their first ten days the fish are fed powdered egg yolk. As they develop a cheap grade of wheat flour is substituted until they are ready for water fleas. Cornmeal mush, as much as 21,000 lbs. daily, is also fed after the second month.

Two ponds are given over to one of the queerest aquatic ranches in the world. They produce billions and billions of water fleas or daphniae for fish food. Red, green or brown—dependent upon the color at the bottom of the pond—they are skimmed off as they rise and dropped into the fish ponds. Care must be taken, as too many fleas may smother the fish.

Chemical research has produced a compound to kill weeds without injury to fish. The formula, however, is closely guarded. Once, during experiments, a weed-killer was sprayed over a pond. It left the weeds and turned the fish blood red.

The goldfish farmer has two major problems—getting the right color in his fish and getting it as quickly as possible. Scores of attempts have been made to speed coloring from the original olive black to their best commercial color but no way has been found. Only nature can do the job. Hatched in June the fish are ready for the market in October. Only about 80 percent of the fish become "gold" fish. The balance, because they are heartier than minnows and remain silver, are sold for bait and to various commercial buyers.

Harvesting the goldfish is an exciting time at the hatchery. Men, wading up to their waists in water, drag huge seines through the ponds. They are followed by crews with long scoops who work across the mud of the bottom when the water has been drained away, filling pails with the fish that remain. Hooked to shoulder yokes, these buckets are carried to waiting trucks and hauled to the ponds surrounding the shipping depot. Here, the

fish are dumped into screen cages where water, driven by an electric pump, sprays over them to harden them for shipping.

Freaks—silver goldfish, specimens with fins in odd, abnormal positions, partial albinos—are segregated during sorting. In all the millions of fish which have crossed the sorting tables at Grassyfork no perfect albino has ever appeared.

The greatest freak in goldfish history, and also the most valuable specimen ever seen in America, was the famous Liberty Bond fish exhibited during the World War. Red, white and blue, it was used to attract crowds during the Liberty Loan drives of 1917 and 1918. Its owner valued it at $10,000. The price of the fish raised in Martinsville runs from a nickel apiece, for small common goldfish, to $25 apiece, for the relatively rare Moor telescopes.

Where do they sell all their millions of fish? Who buys them? Those are questions almost every visitor wants to know. Nickel and dime stores, pet shops, department stores, carnivals, chain stores, drug stores, florists—these all are regular customers. In addition, unusual commercial sales add to the total. They are much sought after for mosquito control work.

Greased Pigs

Skin trouble in pigs is increasing on Minnesota farms, resulting in unthriftiness, loss of gains, and, in some instances, damage evident in the carcasses. Mange is the greatest offender. The remedy is thorough greasing with used crankcase oil from *tractors*. Do not use oil from automobile crankcases, extension men warn, because many of the gasolines used now in passenger and truck motors contain a lead which may get into the oil. Lead-bearing crankcase oils used as a mange cure are likely to prove poisonous to pigs. One skin condition that calls for greasing as a preventative is blistering—occurring particularly in white pigs, which do not carry a protective pigment. This occurs around the neck and head, usually in early spring when pastures are tall. Dew-covered, early-morning grass wets the skin, and in that condition it frequently is blistered by the hot sun.—*W. J. H., Minn., Successful Farming*

Rations for Livestock

Condensed from The Michigan Farmer

FEEDING BEEF CATTLE

AVERAGE daily rations for fattening calves, starting at 400 lbs. weight and gaining 400 to 500 lbs. in 180 to 240 days.

No. 1

Corn or barley or part oats	7.5 lbs.
Cottonseed or soybean or linseed oil meal, or soybeans	1.3 lbs.
Corn silage	18.0 lbs.
Legume or mixed hay	3.5 lbs.

No. 2

Corn or barley or part oats	11.0 lbs.
Cottonseed or soybean or linseed oil meal, or soybeans	1.3 lbs.
Corn silage	8.0 lbs.
Legume or mixed hay	3.0 lbs.

No. 3

Corn or barley or part oats	12.0 lbs.
Cottonseed or soybean or linseed oil meal, or soybeans	1.1 lbs.
Legume or mixed hay or some corn stover	6.0 lbs.

For Medium Grade Cattle Weighing 700 Lbs. or More

Corn silage	unlimited
Linseed meal or Cottonseed meal or Soybean meal	2½ pounds daily per 1,000 pounds of live weight
And access to alfalfa hay	(2 to 4 lbs.)

Unlimited quantities of well-eared corn silage plus a protein supplement and alfalfa hay will produce as high a finish as one is justified in putting on plain heavy cattle if fed 120 to 150 days instead of corn-feeding 90 to 120 days.

Equal parts special steamed feeding bone meal and granulated salt should be available at all times, not in the feed.

Molasses may replace grain in the above rations. More than 2 lbs. per day of beet molasses may be too laxative.

Many other feeds may be substituted for feeds of similar composition in these rations.

The longer the feeding period the more roughage can be used in the beginning to conserve grain for the finish, however gains of less than 40 pounds per month in the beginning or 60 pounds per month toward the finish are apt to be costly. The higher the grade of cattle, the better ration and the longer the feeding period advisable.

Yearling steers may be fed similar rations to those above mentioned with increased amounts according to weights of the cattle. Coarser feeds, such as shock corn, corn stover, non-legume hay, etc., may be used more readily by these older cattle. A protein supplement is much more essential when legume roughage is limited.

FEEDING SWINE

Suggested Grain Rations

I. Suckling Pigs, 5 to 40 lbs. (feed in creep):

1. Corn 80 lbs., tankage 20 lbs.

2. Corn 40 lbs., hominy 40 lbs., tankage 20 lbs.

3. Corn 75 lbs., middlings 10 lbs., tankage 15 lbs.

4. Corn 30 lbs., ground barley 30 lbs., ground oats (screened) 25 lbs., tankage 15 lbs.

II. Weanling Pigs, 30 to 100 lbs.:

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1. Corn 80 to 85 lbs., tankage 15 to 20 lbs.

2. Corn 75 to 80 lbs., middlings 10 lbs., tankage 10 to 15 lbs.

III. Shoats, 100 to 175 lbs.:

1. Corn 85 to 90 lbs., tankage 10 to 15 lbs.

2. Corn 75 to 80 lbs., middlings 10 to 15 lbs., tankage 10 lbs.

3. Corn 50 lbs., ground barley, wheat or rye 40 lbs., tankage 10 lbs.

4. Corn 60 lbs., ground oats 30 lbs., tankage 10 lbs.

IV. Hogs, 175 to 250 lbs:

1. Corn 92 to 96 lbs., tankage 4 to 8 lbs.

2. Corn 60 lbs., ground barley, wheat or rye 35 lbs., tankage 5 lbs.

For pigs weighing 75 pounds and up, well started on pasture, the tankage may be reduced by one-half. Good quality legume such as green leafy second cutting alfalfa should be supplied in some form to all hogs not on pasture.

Skim milk or buttermilk may replace part or all of the tankage in above mixture; 2 quarts per pig on pasture to 4 quarts per pig in the dry lot should be available to replace all the tankage. With lesser amounts, the tankage in the mixture may be reduced proportionately.

V. Brood Sows:

No. 1

Corn	60 lbs.
Whole or ground oats	35 lbs.
Tankage	5 lbs.

Alfalfa Hay

No. 2

Corn	60 lbs.
Wheat middlings	35 lbs.
Tankage	5 lbs.

Alfalfa Hay

No. 3

Ground corn or barley	2 parts
Ground second cutting alfalfa	1 part

Matured pregnant sows should receive 1¼ pounds of grain daily for each 100 pounds of weight. Gilts carrying their first litter should receive from 1.6 to 2 pounds of grain daily per 100 pounds of weight.

With any of the above rations alfalfa or clover hay should be accessible in a rack, except when the sows are on pasture. The Trinity mixture may be used in place of tankage in any of the rations given. With soybean oil meal at the low prices of the past year it could profitably replace one-third of the tankage in the above mixture using the oil meal in equal amounts with the remaining tankage.

No. 4 (For sows nursing pigs)

Corn	60 lbs.
Oats	30 lbs.
Tankage	10 lbs.
Access to legume hay in rack or pasture	

No. 5 (For sows nursing pigs)

Corn	50 lbs.
Barley, rye or damaged wheat	40 lbs.
Tankage	10 lbs.
Legume hay or pasture	

Two gallons of skim milk per sow per day may be used in place of the tankage.

Trinity or Trio Mixture
To be self-fed with corn or other grains
(Protein Supplement for Hogs)

Tankage	2 parts
Vegetable protein (Cottonseed linseed or soybean oil meal)	2 parts
Alfalfa	1 part

Mineral Mixture

Finely ground limestone	2 parts
Salt	1 part
Steamed bone meal	2 parts

FEEDING SHEEP

Rations for Lambs Three Weeks Until Pasture

Oats	5 parts
Corn	3 parts
Bran	1 part
Linseed cake, cottonseed cake, or soybean meal	1 part

Rations for Nursing Lambs on Pasture

Corn (coarsely ground or cracked)	2 parts
Oats (rolled or crushed)	2 parts
Bran	1 part
Pea size oil cake	1 part

Rations for Fattening Lambs

1. Shelled corn, alfalfa, red clover or soybean hay.

2. Barley, alfalfa, red clover or soybean hay.

3. Shelled corn or barley 9 parts; cottonseed cake, linseed cake or soybean oil meal 1 part; corn silage, legume hay.

4. Shelled corn or barley 6 parts; whole oats, 4 parts; cottonseed cake, linseed cake or soybean meal 1 part, corn silage and legume hay.

The feeding lambs should be started on grain gradually, around 3 weeks being taken to get the lamb up to one pound of grain daily. In fact, the daily allowance of grain should not average over one pound per head daily for the first 30 days. Approximately 1¼ pounds of grain per head daily should be fed the second 30 days and 1½ pounds of grain per head daily the third 30 days or until the lambs are finished. In addition to the above grain allowance, the lambs should have all of the roughages as indicated above that they will consume.

Self-Feeding Lambs: Many feeders prefer to handle their lambs on a self-feeder. We have had excellent results with the following ration in a self-feeder:

First 10 days, 2 parts ground or chopped alfalfa to 1 part shelled corn by weight.

Second 10 days equal parts of ground or chopped alfalfa hay by weight with shelled corn.

Thereafter, 2 parts shelled corn to 1 part of ground or chopped alfalfa hay with a limited allowance of long alfalfa hay in addition in the feed rack.

Another method of utilizing the self-feeder that we have found satisfactory is to get the lambs on a full feed of corn by hand-feeding it for 3 weeks and then put them on a self-feeder of straight corn.

Feeds required to produce 100 pounds gain for fattening lambs: Self-feeding: Shelled corn, 413 pounds; alfalfa hay, 314 pounds. Hand-feeding: Shelled corn, 367 pounds; alfalfa hay, 437 pounds.

Rations for Ewes

Up to 30 days before lambing:

1. 3 to 4 pounds of legume hay per day.

2. 2 pounds legume hay daily; 2 to 3 pounds of corn or grass silage.

3. 1½ to 2 pounds of legume hay daily; oat straw, bean pods or corn stalks at will.

Note: If ewes are thin, add to any of the above rations one-half to one pound oats, corn, or oats and corn mixed. All ewes, regardless of their condition should have one-half pound of grain per head daily the last 30 days before lambing, and from 1 to 1½ pounds per head daily following lambing until they go on pasture. An excellent grain ration at this time is one made up of:

Corn, 2 parts Oats, 3 parts Bran, 2 parts Linseed cake, cottonseed meal, soybean meal, or soybeans, 1 part	½ lb. daily

During the winter season, breeding ewes should have access to a mineral mixture consisting of 25 pounds of salt, 25 pounds of steamed feeding bone meal and 1 ounce of potassium iodide.

Recommended Rations for Table Poultry

Condensed from Successful Farming

Phil Perdue

RATIONS for the production of table poultry up to the roaster age, which result in more thrifty growth, better health, and proper bone development, have been developed at the Oklahoma Agricultural Experiment Station. They are not recommended as starting feed for chicks to be grown to maturity as layers or breeders.

Mash Number 1

1,120 lbs. yellow corn meal
500 lbs. wheat shorts
60 lbs. alfalfa leaf meal (20%)
160 lbs. dried buttermilk (34% protein)
40 lbs. cottonseed meal (40% protein)
40 lbs. soybean meal (40% protein)
40 lbs. meat and bone scraps (50% protein)
15 lbs. salt
5 lbs. cod-liver oil
20 lbs. calcium carbonate

Mash Number 2

1,220 lbs. yellow corn meal
100 lbs. wheat shorts
60 lbs. alfalfa leaf meal (20% protein)
300 lbs. dried buttermilk (34% protein)
100 lbs. cottonseed meal (40% protein)
100 lbs. soybean meal (40% protein)
100 lbs. meat and bone scraps (50% protein)
15 lbs. salt
5 lbs. cod-liver oil

Mash Number 3

1,300 lbs. yellow corn meal
160 lbs. wheat shorts
100 lbs. alfalfa leaf meal (20% protein)
300 lbs. dried buttermilk (34% protein)
15 lbs. salt
5 lbs. cod-liver oil
20 lbs. calcium carbonate
100 lbs. casein (80% protein)

Ration Number 1 is the cheapest and produces good growth and viability, but is not the equal

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of Rations 2 and 3 for early growth and low mortality.

Ration Number 3 produces the most uniform early growth and gives exceptional viability. During 4 years of experiments the chicks fed this ration had a mortality of less than 5 percent for the first 4 weeks. This ration contains 1 ingredient, casein, which is not generally sold as a poultry protein supplement. Crude commercial casein is cheaper and more desirable than the highly refined product.

Ration Number 2 was fed to 1,000 chicks which had a mortality rate of 5.5 percent. Their average weight at 12 weeks of age was 2.75 pounds, and they had excellent uniformity of growth.

In all 3 formulas, the variety and quality of ingredients are of great importance. Rapid growth is not obtained with poor-quality ingredients.

For good results, these mixtures should be given as the sole source of feed for the first 8 weeks of the chick's life. At 8 weeks, a scratch grain may be fed in addition to the mash. Any mixture of 3 or more good-quality grains may be fed. A good combination is equal parts of cracked yellow corn, whole wheat, and whole oats. The oats should weigh at least 35 pounds to the bushel.

Welding Steel or Iron with Sand

IF no welding compound is available, a very satisfactory welding job may be done with sand. Heat the pieces of metal to be welded to a cherry red. Sprinkle a little sand on each spot to be welded, and put back into fire. Heat until little sparks fly from the metal. Then take from fire and place on anvil, striking them lightly for the first few blows. Then finish the job as desired.

D. Olen Gilliland

Revolution in a Test Tube

Condensed from New Jersey Farm and Garden

Wallace S. Moreland

IT was bad luck for many a bull when, three summers ago, Enos Perry sailed for Europe to study dairy farming practices in the Old Country. No one expected, least of all Perry, that one result of that vacation trip would be the butchering of an untold number of dairy herd sires. That, however, is exactly what has happened—and the end is not yet.

As New Jersey's extension dairyman, it was only natural that Perry studied with keen interest the functioning in Denmark of the then world's only co-operative association for the artificial breeding of dairy cattle. "That," he said to himself, "is something worth taking to our dairy farmers back home."

Returning to New Jersey, he planted the idea among alert Holstein breeders of Hunterdon, Somerset and Warren Counties. By May, 1938, Artificial Breeding Unit No. 1 of the New Jersey Holstein-Friesian Association was operating as the first organization of the kind in the United States, the second in the World.

The idea spread quickly, as Perry explained its potential advantages. Artificial breeding, he said, would accelerate improvement of dairy cattle by multiplying the breeding value of outstanding bulls. It would reduce the incidence of diseases which cause sterility, and other breeding troubles. It would speed up the proving of young herd sires; make it safe to get them into heavy breeding service before the approach of senility impaired their breeding value. It would facilitate large-scale linebreeding; develop community pride in dairy herd improvement.

Seeking these benefits, 530 New Jersey dairymen have now organized five co-operative breeding units with a total enrollment of 6,100 cows. Each unit hires one or more veterinarians to provide competent scientific control in application of the technique for artificial insemination. Each unit is governed by officers and directors elected from the membership. Each unit is entirely self-supporting. Each unit is truly pioneering in a revolutionary method of dairy herd improvement.

Up to now, the emphasis has largely been on application of the artificial breeding plan on the farm. But science intends to

Reprinted by permission from New Jersey Farm and Garden, Feb., 1940, Sea Isle City

catch up. Studies of wide scope have been initiated in efforts to solve unanswered questions that have come to the fore.

These new investigations have been made possible by the National Dairy Products Corporation, which has established a three-year fellowship at the New Jersey Experiment Station for "a study of methods to increase the efficiency of artificial breeding of dairy cattle." Among other objectives, this research will seek to determine how herd sires and cows should be fed, exercised and managed in order to give the best results under the "test tube" plan of breeding. Studies also will be made of the organization and operation of New Jersey's five breeding units.

Thoughtful dairy leaders are agreed that the grant comes at an opportune time. Some have feared that extension of the "test tube" breeding plan—more than twenty states have followed New Jersey in setting up units—might be too rapid for best interests of the dairy industry.

Research on the problem will provide additional information which can be used to advantage in reaching intelligent decisions as to the form further development of the plan should take.

Air Mail Calf Born at Univ. of Nebraska

Holstein-Fresian Association

Ordinarily the birth of a Holstein calf is not a matter of national interest, but one born at the University of Nebraska, Lincoln, on February 4, 1940, is of vast significance to the entire livestock industry of the world. On that date a purebred sow in the University herd, Lavim Gerblis of U. Neb, gave birth to a bouncing young son through artificial insemination from a bull owned by Mr. H. F. duPont, Winterthur Farms, Winterthur, Delaware, shipped 1500 miles to Lincoln by air mail.

It is believed that this calf represents the longest successful shipment of cattle semen anywhere in the world which has brought about conception and resulted in birth of a calf.

The Farmer Turns to Radio

W. B. Lewis

Vice-President in Charge of Broadcasts, Columbia Broadcasting System

EARLY last spring, a North Carolina newspaper published the picture and story of a farmer who carried a portable radio on his plow.

"I get tired," he explained, "of walking up one furrow and down the next with nothing to concentrate on but the south end of my mule. With this radio set, I can get plenty of entertainment and regular farm news, right where I need it most."

Soon after this story appeared the CBS Research Department received several requests for current figures on radio-equipped plows in the United States. This didn't surprise us, because we're being asked all kinds of questions, these days, about the farmer and his radio. For today radio has become vitally important to a regular farm audience of over ten million families. Our studies show that this audience is growing even more swiftly than its urban counterpart. And we have found that the farmer listens more every day than his city cousin.

This rapid upsurge of radio on the farm is particularly striking in view of radio's earlier history. After all, radio is a city-born medium. In the beginning it gained most swiftly among urban families. This was natural, for the first receiving sets were concentrated nearest to radio stations. But as the voice of radio became stronger, it soon overstepped city bounds. Farm families by the millions joined its audience. And there is growing evidence that today the farmer is the most radio-minded member of the entire listening public.

Rural radio ownership has jumped from an estimated one out of four rural families in 1930 to three out of four today.

Increased power at the transmitter carries the brilliant variety of modern radio programs across miles of space, directly into the farmer's parlor, kitchen, and often even into his barn. In the past three years alone, 112 CBS stations have improved their power and equipment to reach the farmer with a clearer, stronger voice. And two other factors, familiar to all rural communities, have helped more farmers hear that voice: the spread of rural electrification and the improvement in battery sets.

These technical advances are important reasons why the farm-

er is turning so strongly to radio. Even more important, however, is the parallel fact that radio is *turning to the farmer.*

Before we could attempt to serve the farmer with what he wants, our research men had to find out all they could about him; how he lives; how much he listens; what programs he prefers; how radio affects his whole life.

Some indication of the growth and intensity of farm listening, as compared to city listening, has already been mentioned. Another encouraging discovery we have made is that rural and urban audiences are strikingly alike in their general program tastes. Last year CBS went into farm and village homes in every state in the union, asking people which of the then-current programs they listened to. None of the programs on that list had any specific rural appeal, yet here's how four CBS programs, top-ranking coast to coast among *all* listeners, showed up among *farm* listeners: 55% of all rural families reported hearing the Lux Radio Theatre; 58% heard Kate Smith; 72% heard Eddie Cantor; 81% heard Major Bowes. Based on the latest available ownership data, as of January, 1938, this means a rural audience of 7,671,500 families for the Major and his amateurs!

This CBS research study also showed how similar rural radio tastes are in different parts of the country. Programs that win friends on Vermont farms are just as strong an influence in New Mexico; the Oregon apple grower and the Georgia tobacco planter sit down to pretty much the same broadcast fare every day in the week.

Another study last year, sponsored by CBS and other networks, translates this rural interest into a decimal-point measure of actual rural listening. We found that the average farm family uses its radio *five hours and eighteen minutes a day*—twelve minutes longer per day than the average city family. We found that for ten solid hours, between 7 A.M. and 5 P.M. there is actually a larger percentage of rural sets in use than of urban sets.

Seven o'clock in the morning is the earliest hour for which the research people have collected nationwide information on farm listening. Several of our individual CBS stations, however, have made studies of their own areas and produced some interesting results.

WCCO, Minneapolis, checked early-morning listening habits in the Northwest and discovered that about *one out of four* radio sets in that area are in use by 6.30 A.M. Clearly the farm family's daily working schedule—from "can't see" to "can't see"—is more than matched by their

use of radio, for the latter extends well into the evening as well.

Why has radio developed such an absorbing interest on the farm? Not merely because it offers limitless entertainment for the whole farm family—radio is more than that. It has become virtually a working partner of the farmer, providing him with many things he needs in his regular working day.

That's why the first place on the farmer's radio preference list, no matter how much he likes popular general entertainment programs, is reserved for *radio news*. Broadcasting has long since displaced the newspaper for him as the best source of news. Its agility and its globe-circling speed bring to every listener on every distant farm the sound of news *in the making*.

A recent, state-wide survey of all radio homes in Iowa included this question: *"Do you depend most on a daily newspaper, or on radio, for important national news?"* Among city folk in Iowa, radio was favored by a slight edge: 39.1% to 38.9%. In Iowa villages, the ratio jumped to 48.6% for radio, 27.5% for newspapers. But when the Iowa farmer spoke up, he chose radio 56.7% to 21.3% . . . better than two to one preference!

When Iowa listeners were asked to pick five favorite program types from a list of 16, "News Broadcasts" were most frequently mentioned, with "Comedians" second. Almost identical results were obtained when the same research group rang doorbells in Kansas. "News" again led the field, with "comedians" again second.

The farmer's need for news is wholly different from the city man's. He, of course, wants to keep posted on world events, on sports and politics. But more than this, the farmer needs news of crops and markets and weather. And he has learned to turn to radio for prompt information on his own problems.

This means that farm news must be locally originated service. When war clouds loom over Europe, it is, of course, up to CBS as a *network* to report events as they happen. But no network can give the farmer the local news he needs; that is up to the individual CBS affiliate. Almost all of Columbia's 117 affiliated stations broadcast local programs specifically designed to serve the rural listeners in their areas. A report from Columbia's affiliated stations last year showed that they were producing 320 special farm programs every week, and this service is constantly expanding.

A glance at the program schedule of WCAU, the Columbia affiliate in Philadelphia, clearly

shows how individual stations serve the farmer. Each day begins with more than an hour of entertainment, ranging from music to market quotations, presented solely for the farmer. In the middle of the day farmers may hear the latest market prices. To supervise such a schedule WCAU maintains a farm bureau, directed by an able agricultural authority, Mr. Charles Shoffner. Every Saturday at noon Mr. Shoffner conducts the WCAU "Farm Weekly." Guest experts are called upon to answer and solve the many questions and problems submitted to the bureau by rural listeners.

WBT, the CBS station in Charlotte, N. C., further demonstrates the way such local services work. The WBT Farm Bureau is headed by a full time editor and librarian to handle individual replies to questions from farmers on agricultural programs, and to produce programs furnishing authoritative data on latest farming methods. The farm bureau has obtained from the U. S. Department of Agriculture a library of over 4,000 government bulletins and year-books—largest and most complete collection of any U. S. station.

A random round-up of experiences at other CBS stations shows that these localized efforts are bearing record fruit. The Indiana Farm Bureau, following a year's use of WFBM, Indianapolis, checked with its branch managers throughout the state and found that thousands of baby chicks had been sold by the Bureau's hatchery to farmers in that section—directly traceable to the farm program on WFBM. Branch managers of the Bank of America, located in the citrus belt in California, reported that weather reports and frost warnings on KNX, Los Angeles, were being heard with 100% regularity by farmers in their areas. Farmers listening to a program on WWL, New Orleans, wrote over 5,000 letters to the station after a single broadcast.

Examples of this kind of service to farmers are literally endless. With local CBS affiliates doing so capable a job—in the words of farmers themselves—what can Columbia as a network contribute?

Radio's seven-league boots have so shrunk space and made neighbors of all listeners that the farmer is one with the city dweller in his general interests and tastes. But we are fully aware that the farmer has specific needs and specific problems, and should have programs on the network specifically designed for *his* listening.

Such network service for the farm audience is typified in the "Columbia Country Journal," directed by Charley Stookey from

St. Louis and broadcast over CBS every Saturday from noon to 12.30 P.M. Eastern time.

1. *A five-minute news period.* Items of nationwide interest are compiled from Department of Agriculture material, from farm journal editors, and from farm market reports.

2. *A guest speaker.* Well-known, well-informed men like Senator Capper and Secretary Wallace bring to the microphone timely discussions of subjects important to all farmers everywhere.

3. *Interviews.* Here again the requirement is for men and subjects of wide interest. The farmer who has developed some new agricultural process, or is working on some new, revenue-increasing theory, gets the call to the "Country Journal."

4. *Special Events.* "Columbia Country Journal" gets nimblely around the country when a state fair or an exposition far from St. Louis merits nationwide attention. Recent examples of this on-the-spot coverage are the Shreveport Fair and the International Livestock Exposition.

This, then, is how radio serves its rural audience: with daily, localized news and counsel by individual stations; with the best possible entertainment features from local stations and the network; and with regular, coast-to-coast network programs like the "Country Journal," broadcast by, for and to the farmer (although millions of urban listeners eavesdrop on it every week)!

In this way radio produces balanced broadcast fare the farmer wants to hear. We find our present efforts arousing more attention and comments than ever before. A significant portion of these comments come from people in cities, indicating that our programs for and about the farmer have helped make him better known to his city-cousins.

Most of all, however, we value letters and criticisms from the farmer himself. The things you tell us about your use of radio are of most help in planning our rural service. That's why we hope you'll sit down now and tell us what *you* think about radio, and what you want to hear from CBS.

The Blood-Plate Test for Mastitis

Condensed from Guernsey Breeders' Journal

Dr. C. C. Palmer

Director of Haskell Animal Disease Research, University of Delaware, Newark

BREEDERS of dairy cattle have recognized the fact for many years that mastitis is one of the most common diseases of the dairy cow. This is true not only in this country but also in all parts of the world where dairy cattle are raised. Efforts to control the disease by chemical or biological means have failed whenever the chemical agent or biological product of supposed therapeutic value has been submitted to critical test. While awaiting the discovery of a curative agent, mastitis continues to spread, chiefly by introducing into the herd infected carrier cows, which sooner or later develop into clinical cases, and which will introduce the disease into a clean herd or a new variety of mastitis infection into a herd already infected with mastitis.

From a causative standpoint mastitis is a complex disease. There are a number of different germs capable of causing mastitis. This fact will explain why the damage caused by mastitis is more serious in some herds than in others. It also explains why a line of treatment which appears to be effective in one herd may be without value in another. The more research workers learn about this disease, the more complicated it becomes from a causative standpoint. For example, it is generally accepted that streptococcic mastitis caused by *Streptococcus agalactiae* is the most common type of mastitis, but as a result of recent research it has been found that there are at least several types of *Streptococcus agalactiae*. These various types differ from one another in their chemical composition and biological properties, with the result that while certain chemicals (drugs) may be destructive for some types, they are ineffective against others. The same is true of biological products, such as serums and vaccines. Furthermore, some types are more virulent or disease-producing than others. One of the most important objectives today in mastitis research is the determination of the several types of streptococci found in mastitis. Until this work is placed upon a sound scientific

Reprinted by permission from the Guernsey Breeders' Journal, February 15, 1940, Peterborough, N. H.

basis research with chemical or biological cures cannot proceed.

What the Breeders Can Do Today

While waiting for the research worker to discover a cure, the breeder can take the necessary steps to prevent introducing into his herd a new type of mastitis infection, which may prove far more dangerous than the one or several already in his herd, or if his herd is mastitis free he will certainly not wish to introduce the infection. This may be accomplished by making certain that all new herd additions are free of mastitis infection. Some breeders have been attempting to do this, but for the most part the movement has not been very successful due to the fact that the tests which have been employed for detecting the carrier cows have not been sufficiently accurate.

Physical examination of the udder and milk by an expert will detect many of the infected animals but will fail in those subclinical cases which are carriers of the infection but in which clinical symptoms have not yet appeared.

There is available a test which will detect both the clinical and the sub-clinical cases. This is the so-called bloodplate test. This test requires submitting a small sample of the milk, preferably samples from individual quarters, to a competent bacteriological laboratory where the milk is cultured upon ox-blood media. In our laboratory we have found that the best medium for growing the mastitis organisms, and especially the various mastitis streptococci, is a basic medium of tryptose agar to which is added ten per cent ox blood. After streaking the milk upon the blood-tryptose agar the plates are incubated at body temperature for two days when they are examined for the presence of mastitis bacteria. When this examination is made by competent bacteriologists experienced in mastitis work, the test is highly accurate and can be depended upon to detect infected cows in advanced or beginning mastitis.

In the light of our present knowledge of the disease and the various tests which have been recommended, the blood-plate test is the only test which should be recognized. Research work should be continued in an effort to find a simpler test, preferably one that may be used in the field. But in the meantime, the blood-plate test, if properly conducted, may be employed to marked advantage in controlling the spread and dissemination of the several mastitis infections.

How Weedy Is Your Grass Seed?

Condensed from The Ohio Farmer

L. E. Thatcher

THE control of weeds is one of our most difficult problems. Many farmers contend that weeds are becoming worse and many seedsmen are also of this opinion.

This is undoubtedly true for some localities. Not only must we face the problem of an increased population of our older bad weeds, but some very objectionable newcomers are showing up here and there.

The control of weeds is the primary reason for the cultivation of crops. If there were no weeds most row crops could be grown at a saving of from two to five dollars per acre in labor alone. Weeds also contribute to a reduced quality of crop, particularly in meadows and pastures. Weeds are very objectionable in hay; they interfere with proper curing and they reduce the feeding and market value.

When seed crops of the clovers, alfalfa, or timothy are harvested from weedy meadows, the weed seeds are harvested with the forage crop seeds, and herein lies the cause of much of our weed problem. Unless these weed seeds are removed from the forage crop seed, they continue to increase on the land where the unclean seed is sown. Progress in weed control will be slow and difficult until farmers generally become more "weed conscious" in the sowing of clover, alfalfa, timothy, and other forage crop seeds.

Perhaps the lack of appreciation of this fact by farmers generally can be traced to a lack of definite information regarding the weed seed content of seeds sown by them. Much of the clover and grass seed sown on Ohio farms has been improperly cleaned or not cleaned at all.

Sometimes the seed dealer is blamed for selling weedy grass seed, and there are instances where this has happened. However, the purity of seed which has been properly cleaned is so superior to much of the farmer's own seed that there is little comparison. Most all seedsmen take pride in putting out a superior product.

But the farmer is not without his share of responsibility even when purchasing from seedsmen.

Reprinted by permission from the Ohio Farmer, January 27, 1940

He should form the habit of reading the tag attached to the bag of seed, and most of all, he should know what it means. The Ohio seed law requires that all agricultural seeds "sold, offered or exposed for sale within this state for seeding purposes within the state" shall be tagged or labeled to show, among other things, "the approximate total percentage by weight of weed seed—," and the name and number per ounce of each kind of seed or bulblets of the noxious weeds—."

Farmers are exempt from the labeling provision of the act unless they advertise the seed for sale through any medium or deliver it to the purchaser through a common carrier, i.e., by freight, express, parcel post, etc.

Since the seedsman is obliged to give this information on the tag or label, it is up to the farmer to read the tag. If he fails to do so, he has only himself to blame if he gets undesirable seed. Low-priced bargain counter seed is generally under suspicion of being low in quality.

When the farmer sows seed labeled according to the law, he has a means of knowing just what quality of seed he is sowing. When he sows his own seed or that obtained from a neighbor by means of "over-the-fence" trading, he does not know unless he has gone to the trouble to have the seed analyzed.

It would be a surprise to many farmers if they knew how weedy much of the seed is that they harvest and how difficult it is to clean it. The ordinary farm fanning mill will remove the chaff and dirt and the general-purpose cleaners at most elevators and country dealers do a little better job but will not remove many kinds of noxious weed seeds very efficiently. Too many farmers depend upon these cleaners to prepare noxious weed infested seed for home seeding or for trading to their neighbors.

Many times when farmers take their seed to a cleaner they insist upon having their seed cleaned according to their own specifications and will not depend upon the experience and judgment of the mill operator. They watch the tailings and if they see some clover or grass seed coming over the screens they object. The majority of mill operators doing custom work will do the job to suit the customer even though they know that more weed seeds will be carried by the so-called clean seed. Some weed seeds are the exact size and weight of some of the forage crop seeds, and, even with the most modern equipment, they cannot be completely separated.

I recently made a survey of a number of seed establishments in Ohio to find out just what the average 1939 thresher-run seed

from Ohio farms was like. The average results of this survey follow:

Kind of seed	From 100 pounds of average farm-run seed the cleaners obtained: Clean seed Pounds	Loss in cleaning Pounds
Red clover	73.5	26.5
Alsike	81.2	18.8
Alfalfa	76.2	23.8
Timothy	88.0	12.0
Sweet clover	72.2	27.8

The losses in cleaning for different sections of the state varied considerably. The loss for red clover ranged from 10 to 50 percent; for alfalfa, 10 to 40 percent; timothy, 9 to 20 percent; and sweet clover, 15 to 60 percent. Much of the heaviest loss in cleaning was from seed harvested with the combine harvester. Harvesting forage crop seeds is so conveniently done with a combine that the temptation is great to harvest the crop in this manner from fields that contain too large a proportion of weeds. The removal of such large amounts of material from the clover or other forage crop seed is expensive and reduces the price that can be paid the grower.

It is probable that many farmers would be glad to have some simple method of making a rough estimate of the weed seed content of their clover and timothy seed. With this in mind, a method has been devised and is described below.

This method by no means is to take the place of the official seed analysis made by the State Seed Laboratory, and the results from it cannot be used for labeling seeds for sale. It will be useful to farmers as a rough check on the weed seed content of seed which they have cleaned themselves or which has been cleaned by a neighbor or country dealer.

The necessary equipment consists of a silver half dollar, a small spool with a top diameter smaller than the coin, a small tin can pinched at the top to form a spout, a reading glass, and a knife. A reading glass good enough for this use can be bought for a dollar or less.

The seed to be tested should be representative of the seed that is to be sown. It should be free from chaff, small sticks, and dirt.

Spread down a paper and place the spool in the center, making sure it sets level. Place the coin on the spool so that its edge extends beyond the spool top on all sides. Fill the can about two-thirds full of seed and hold the spout two inches above the coin. Pour gently until the coin is full and running over. Carefully transfer the coin and seed to a plain piece of paper under a good light. Look at the seed through the reading glass and sort out the weed seeds with the knife. Count the number of weed seeds in the sample. Since there are about 190

to 200 of the samples in a pound of red clover, alsike, and alfalfa and about 240 to 250 in a pound of timothy, the number of weed seeds multiplied by these figures gives the approximate number of weed seeds per pound.

In a sorted sample of red clover 15 weed seeds were found. Therefore, if 10 pounds of this seed were to be sown per acre, the number of weed seeds sown per acre would be around 28,500 to 30,000.

If the half-dollar test shows that the seed is too foul for use on the farm, the safe thing would be to take or send the seed to the nearest seed-cleaning establishment with modern equipment. It may cost $1 to $1.25 per bushel to have it properly cleaned, but even so it is money well spent. If he has no convenient way of getting his seed to such a cleaner, then the farmer might sell his own seed to a buyer and in turn buy cleaned seed. Let us suppose, for example, that the farmer could get only $12 per bushel for his own seed and had to pay $18 for clean seed. If he sowed 10 pounds of seed per acre he would save $1 per acre by using his own seed. That seems to be a worthwhile saving on the face of it, but consider this: Suppose someone were to offer to pay him $1 per acre for the privilege of sowing broadcast on his farm 60,000 buckhorn seeds per acre or 10,000 dodder seeds or 30,000 chicory seeds or 16,000 wild carrot seeds —these quantities have been found in farmers' samples. Would he accept the offer? The chances are he would not.

The advantages of sowing home-grown seed provided it has been well cleaned should not be overlooked. When a strain of clover or alfalfa has been grown for several seed generations in a locality, it becomes adapted to that locality, and every effort should be made to obtain the full measure of its inherent ability to yield. This cannot be done if weeds compete too strongly with the clover or alfalfa crop, reducing the yield and quality of the harvest.

The American Dairy Cattle Club

Condensed from American Indexes, 1939

THE dairyman knows that the way to keep his costs lowest is to keep cows that produce the most milk per year under good average conditions, and that stay in his herd as producers the greatest number of years. These cows must be well above average producers, for the time has passed when milk can be produced at a profit from low or even average producers. The dairyman must realize that he cannot profitably build up a herd of this kind by "cow-trading." True, he can usually buy a fresh cow for less than it costs him to raise a heifer properly to milking age. But the cow which he buys at that price will either be an average or a below average producer. Furthermore, cow trading is almost sure to bring disease into the herd, which sooner or later will be very costly. Consequently the commercial dairyman of today must necessarily be a breeder of high-producing dairy cattle.

Much has been written on the breeding of dairy cattle, and we cannot discuss the details of the subject here. We will therefore confine ourselves to a statement of what we believe to be the two most important conclusions established in this field to date—namely,

(1) *The following methods of selecting dairy animals cannot be relied on for further lowering of production costs:*

(a) *Selection merely because the animals are registered,*

(b) *Selection on the basis of type alone,*

(c) *Selection on the basis of distant blood lines,*

(d) *Selection of females on individual records alone, particularly forced records,*

(e) *Selection of males on dams' records alone, particularly forced records.*

(2) *The surest way to make progress is (a) to determine the actual production level of each female in the herd by averaging all her lactation records made under continuous herd test conditions, and (b) to breed the herd to a proved bull with an index, fairly calculated, higher than the average production level of the females.*

The breeder who appreciates the truth of these conclusions, and applies them to his own herd, instead of relying on so-called short-cuts, will save himself many

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disappointments. Because of his low cost production, he will have a much better chance to make money when the price to the producer is low. He is the one who will stay in the business.

It is often said that high-indexed bulls are not available, and it is true that there is a shortage of such bulls. This situation will continue until the work of proving bulls progresses further, and the value of good proved bulls is more widely recognized. However, a glance at our published lists of proved sires will show that there are high-indexed bulls living and for sale at reasonable prices. The services of high-indexed bulls will, we believe, also become more widely available as more artificial breeding associations become established throughout the dairy States. It is usually the main part of the program of these associations to maintain at least one such bull. If, however, neither a high-indexed bull nor his services can be obtained, and an unproved bull must be used, we recommend the son of a high-indexed bull out of a good daughter of a high-indexed bull.

The American Dairy Cattle Club, a national open registry association for dairy cattle, is organized (as a non-profit corporation) for the single purpose of helping the American dairyman apply the conclusions just stated to his work as a breeder. We have made these conclusions the basis of our registry system, which consist of four orders of recording. Each order represents a generation, starting with the first, or lowest, and progressing to the fourth, or highest order. Higher orders may be added if necessary as our work advances. We have a performance requirement but no pedigree requirement for recording in the First Order. For recording in all higher orders, except as hereinafter stated, we have a pedigree as well as a performance requirement. These requirements are set out below.

PEDIGREE REQUIREMENTS FOR RECORDING

1st Order—No pedigree requirement.
2nd Order—Parents must be recorded in at least the First Order.
3rd Order—Parents must be recorded in at least the Second Order.
4th Order—Parents must be recorded in at least the Third Order.

The pedigree requirement for recording bulls in the Second Order is waived in the case of bulls with a 10-pair index of 450 lbs. butter fat.

PERFORMANCE REQUIREMENTS FOR RECORDING

The minimum requirements for recording, in terms of 305 day, twice-a-day milking, mature records and American 5-pair indexes based on such records, are as follows:

	Records of Cows	Indexes of Bulls
1st Order	A complete lactation record (No quantity requirement)	375 lbs. B.F.
2nd Order	350 lbs. B.F.	400 lbs. B.F.
3rd Order	375 lbs. B.F.	425 lbs. B.F.
4th Order	400 lbs. B.F.	450 lbs. B.F.

The performance requirement for recording cows in the First Order is waived in the case of any cow with two daughters having records of 300 lbs. butter fat each.

With respect to these requirements, we desire to point out first, that the foregoing schedule is new, having been adopted this year as a result of the recommendations of our Advisory Council, made at its meeting of January 6, 1939.

Secondly, any cow in the country, whether registered or unregistered, can qualify for the First Order on making a complete lactation record. This provision makes ours a truly democratic, "open" system, as distinguished from those systems, sometimes called closed registry systems, which are based on the registry of parents alone. Under our system, First Order animals may be thought of as foundation stock, and new foundation stock may always be added by admission to this order.

Thirdly, these requirements establish a registry system based not on production alone, nor on pedigree alone, but on performance of both males and females, plus pedigree for performance where pedigree counts—that is, in the immediate ancestry.

Thus no animal (with the exception of Second Order bulls above referred to) can be recorded in the second or higher orders, no matter how high its record or index, unless its immediate ancestors have met the performance requirements of the preceding orders. Nor does the performance of an animal's ancestors entitle it to recording in the second or higher orders unless the animal itself meets the performance requirement of the particular order in question.

"In other words," as is explained in a recent issue of *Hoard's Dairyman*, "a Fourth Order cow is an individual producing 400 lbs. fat or more and without a blank as to indexes of bulls or production of cows in her pedigree. She must have seven proven sires and seven dams with records in the first three generations of her pedigree. An animal failing to qualify, as far as her record is concerned, for a certain order is automatically dropped into that group she can qualify for, irrespective of how good her ancestry. There is no possibility of jumping from a First Order to a Third or Fourth

Order by forced record making. A cow can never go higher than one step ahead of her mother no matter how high her record, but she can fall into a lower order if she fails to prove her own production worth."

The purpose of our program is to "grade up" to higher and more profitable production. This program can be applied just as well within closed registry association limits as with unregistered animals, and there are frequently advantages in doing so. We believe that the animals which are recorded in our higher orders will breed more true for high production than those which result from any system that does not have performance requirements for registry.

The question will arise in your mind whether the individual breeder could not follow out the breeding practices which we recommend with the assistance of other agencies already in the field. You will want to know specifically what services this Club has to offer him.

In answering this question, we may say that we do not compete with nor duplicate work of any of the other agencies in the field. On the contrary, we co-operate with them and supplement their work. We are in a position to be of particular service to the owner of unregistered animals who is in or is willing to enter D.H.I.A. work. When he identifies and tests his animals with us, we offer him certain services which, it is true, he could perform for himself, but which he often neglects or on which he needs assistance. With these services we offer also other services which he could not perform for himself.

Among our services to the breeder are: Calculating his D.H.I.A. production records to the standard milking period basis, averaging the successive records of each cow, so calculated, and issuing cumulative certificates of pedigree and performance on each cow at the end of each lactation period; calculating his herd average on the same basis each year; calculating the indexes of his bulls and issuing similar certificates as each successive five pair index is completed; and comparing the indexes with such herd averages so that he can tell as fast as the information is available whether he is building his herd up or pulling it down. These we believe are services of basic importance to his existence as a dairy farmer. Some of them he could, but usually does not perform for himself. Most of them are not duplicated by the work of the dairy herd improvement associations, as supervised by the United States Department of Agriculture and the agricultural colleges.

In the same category of ser-

vices to the breeder, we may mention the fact that our requirements stimulate him to qualify his animals for progressively higher orders of recording. Thus they give him encouragement to undertake or continue testing work, to use high-indexed bulls or the sons of such bulls, and to study his records in order to check the progress he is making up the ladder of our orders.

Far more important, however, is the fact that The American Dairy Cattle Club offers the means by which a number of breeders can work together in applying our breeding principles, and so makes it possible for each one to progress faster than he could, working alone. The registry association principle has long been recognized as useful in the co-operative improvement of live stock. We offer registry association advantages to the breeders of unregistered cattle—a service which no other agency attempts to perform. Our system recognizes the fact that 80% of the D.H.I.A. cows in the country are unregistered, that it is extremely doubtful whether, with the same feed and care, there would be any difference between the producing ability of this 80% and the 20% that are registered, and that certainly many of the unregistered group are better than many of the registered group. We therefore do not require you to buy American cattle. We urge you to start with what you have in your barn and breed them up. When your animals have met our requirements, we then give currency to their worth by issuing our certificates of performance and pedigree (Recording Certificates) on them.

To the breeders of registered as well as unregistered cattle, we offer a sounder registry program than is made available to them by any other agency. Our program is the only one based on the standards in which the dairyman is primarily interested—namely, individual performance plus the ability to transmit that performance. As a result, our certificates will in time carry a face value, and they will bring the price to which fair value is entitled.

In short, the service that we render to our breeder is to assist him to develop or improve the market for his surplus animals as breeding stock, and to produce his milk at lower cost, which he must do in order to stay in business under present conditions, and in order to earn a livelihood for himself and his family.

(More complete information may be obtained upon application to the American Dairy Cattle Club, 11 South La Salle St., Chicago, Ill.)

New Strain of Clover

Condensed from Capper's Farmer

Maurice R. Haag

MAMMOTH clover may once more take its place as a front line meadow crop.

A strain of this legume recently has been attracting attention in Wisconsin for its ability to outperform its smaller cousin, medium red clover. J. H. Torrie, agronomist at the Wisconsin Experiment Station, reports that the strain has been grown on the P. C. Graham farm, Grant county, for more than 40 years.

Two years ago when other fields of medium red clover in that county suffered damage from winter killing, fields of Graham mammoth was unharmed. Seed was taken to the Wisconsin Experiment Station at Madison and similar results were noted there.

During the winter of 1938-39, nearly every field of medium red clover in southwestern Wisconsin was reported to have suffered some injury. Fields of mammoth clover on the Graham farm and plots at the Experiment Station again showed no winter killing.

In yield, the mammoth variety also has outdone medium red. In 1938, it gave 3.79 tons of hay an acre while medium red planted alongside gave 3.35 tons. Again in 1939, on the first cutting a mammoth-timothy mixture gave 2.23 tons an acre while medium red clover and timothy yielded 1.61 tons.

Like other mammoth clovers, the Graham strain tends to be a perennial rather than a biennial crop. Under favorable conditions a stand often will give a crop of hay for 2 or 3 seasons. This perennial quality gives mammoth clover an advantage in erosion areas where hillsides need to be kept in sod for several years.

No experiments have been run on feeding values with the crop. However, observations at the Graham farm indicate that it is fully equal to medium red clover when cut at the one-third or quarter-bloom stage. Cut later than this, the resulting hay is coarse and stemmy and cattle do not eat it as well.

A limitation of mammoth clover is its tendency to give only 1 cutting while medium red, which matures about 2 weeks earlier, usually can be cut a second time. Early cutting of mammoth helps overcome this disadvantage and makes for better

Reprinted by permission from Capper's Farmer, Feb., 1940, Topeka, Kansas

growth later in the season.

Farmers of a half-century ago were more familiar with mammoth clover. The practice then was to cut hay as late as possible to get heavier yields, a practice working in favor of the ranker and heavier mammoth varieties.

With the coming of dairying and with more emphasis on winter feeding, there was some trouble in getting dairy cattle to eat the late cut and coarse hay from mammoth clover. Fine quality medium red clover grew more popular and for many years the other variety has been thrust into the background.

Newer fashions in farming seem likely to change that picture and to make possible a revival of the crop. Earlier cutting of hay, which was what was needed to make mammoth clover a useful crop, is now recommended and is becoming an accepted practice on most farms.

New methods for ensiling grasses and legumes have been developed. With many crops less palatable than mammoth clover being fed in this form, it is felt that the newly recognized Graham clover also can be converted into a feed which cattle will relish.

Thiamin in Milk

Condensed from The Jersey Bulletin

THE National Dairy Council states that since vitamin B1 (thiamin) has been separated from the other components of the vitamin B complex and has been identified chemically as thiamin, one problem confronting nutritionists is whether our ordinary foods contain sufficient amounts of this important vitamin. Because it is necessary to depend on a variety of food items to furnish the day's supply of thiamin, it is important to know which everyday foods can be relied upon as sources of the vitamin.

Loss of appetite (anorexia) is one of the first observable symptoms of thiamin deficiency. According to McCollum "we do not know of any dietary inadequacy which occasions such a marked degree of anorexia." Dramatic restoration of desire for foods occurs when thiamin is given; it may occur in 24 hours.

Thiamin deficiency affects the gastro-intestinal tract, causing considerable anatomical and functional changes. In its severe form it is known as beriberi. Borderline cases of thiamin deficiency are relatively common today, due

Reprinted by permission from the Jersey Bulletin, Jan. 24, 1940, Indianapolis, Indiana

largely to the increased consumption of highly refined foods and sugar. Such foods tend to be deficient in vitamins, and their liberal consumption crowds out of the diet such foods as milk, fruits, vegetables, and whole grain cereals, causing a partial deficiency of any or all of the vitamins. Ill health may result from a slight deficiency of thiamin much less severe than is necessary to bring about the symptoms of beriberi.

That shortage of thiamin in the average American diet is coming more and more to the attention of physicians and nutritionists is evidenced by a recent report of the Council on Foods of the American Medical Association. In this report, Dr. Cogwill states: "There are grounds for believing that American dietaries as a whole are unsatisfactory with respect to the content of vitamin B1."

The human daily requirement is generally stated as 1 to 2 milligrams of thiamin, or between 300 and 600 international units. These are probably liberal amounts. Dr. Hazel Munsell in summarizing the thiamin requirement recently said: "The indispensable minimum for vitamin B1 seems to be in the region of 200 international units per day. For the average adult of moderate activity, 300 to 400 international units daily may be taken as adequate and 500 to 600 units daily should assure optimum nutrition." The range in requirements for children from pre-school age to post adolescence appears to be about 200 to 600 international units.

Thiamin is apparently not stored in the body and is rapidly lost from the tissues during short periods of deficiency. It is therefore important that the daily diet contain adequate amounts of thiamin.

A person's weight, caloric intake and degree of activity influence the amount of thiamin he needs daily. A preliminary report recently issued by workers in the U. S. Public Health Service indicates that calcium deficiency, at least in rats, produces an inability to utilize the vitamin B1 available in the diet. The amount and quality of fat in the diet is also a determining factor; if the diet contains large amounts of fat, less thiamin appears to be needed.

Accurate figures for the thiamin content of milk and of other foods are difficult to obtain. Many complications arise in assaying foods for their thiamin content by the biological assay method; when a reliable chemical method of analysis has been developed, our knowledge of the thiamin content of foods will be greatly increased.

Recent work tends to confirm Dr. Munsell's statement that

"milk becomes an important source of vitamin B1 when considered on the basis of the quantity usually consumed and the fact that it may be used without treatment that would tend to lessen its potency." Although the foods generally accepted as the best sources of this vitamin (such as wheat germ, whole grain cereals, liver) contain more thiamin per serving than does milk, the fact that milk is usually used at every meal brings milk into a position of prominence as a dependable, everyday source of thiamin.

Present figures on the thiamin content of milk vary considerably, ranging from about 125 to 244 international units per quart. The following table shows the percentages of the daily requirement for thiamin which are furnished by one quart of milk, when using the minimum, adequate and optimum requirements for thiamin and the highest and lowest available figures for thiamin in milk:

1 qt. of milk	200	300	400	500	600
125 units...	62%	42%	31%	25%	20%
244 units...	122%	81%	61%	49%	41%

From the above table it is evident that one quart of milk supplies from 20 to 41 per cent of even the very liberal requirement of 600 international units, and from 25 to 49 per cent of the more commonly used standard of 500 international units.

Success in Handling Feeder Cattle

Condensed from Washington Farmer

ONE of the essentials in the planning of a cattle feeding operation is to know how much feed will be required for a given number of cattle. Careful records kept by the animal husbandry department of the state college reveal the amount of feed required to fatten good quality steers. These were made up of three classes of feeders; calves, yearlings and two-year-olds.

The average weight of the calves at the start of fattening was 436 pounds. They were fed for 150 days and sold at an average weight of 737 pounds. The total gain was 301 pounds per head, an average of 2.01 pounds per day. To make this gain, they consumed 1301 pounds of grain per head and 997 pounds of chopped alfalfa hay. The average daily feed per steer was 8.67 pounds of grain and 6.65 pounds of hay. For each 100 pounds of gain, they ate 432 pounds of grain and 331 pounds of hay.

The yearlings also were fed 150 days, during which time they

Reprinted by permission from the Washington Farmer, January 18, 1940

made gains of 281 pounds, and were sold at a final weight of 830 pounds. The average daily gain was 1.87 pounds. The total feed consumed by the yearlings was 1492 pounds of grain and 1387 pounds of hay per head. The average daily feed consumption was 9.95 pounds of grain and 9.25 pounds of hay. For each 100 pounds of gain they ate 531 pounds of grain and 494 pounds of hay.

The two-year-old steers were fed for 120 days. Their average gains were 274 pounds, and the final weight was 1017. Their average daily gains were 2.28 pounds, and the total feed consumption was 1382 pounds of grain and 1512 pounds of hay per head. The daily consumption averaged 11.52 pounds of grain and 12.61 pounds of hay. For each 100 pounds of gain their feed consumption was 504 pounds of grain and 552 pounds of hay.

"The kind of cattle to feed is an individual decision," report Professor Howard Hackedorn and Ralph McCall, "depending upon the relation of the price for the various classes and grades at the time of purchase and the probable margin. The lower-priced feeds, grass, hay, silage, cull potatoes, etc., as a rule make up most of the rations fed to the lower-priced classes of cattle.

"The inexperienced feeder as a rule will be more successful with the desirable grades of cattle which have a good resale value when fat. Cows and most low-grade steers find their best markets throughout the winter and spring months before the grass cattle arrive to fill the demand for the lower-priced grades of beef.

"Market prices for good steers are usually highest during the months of May, June and July and lowest during September, October and November.

"The feeding of calves requires more skill than the feeding of older cattle. To reach a satisfactory market finish they should be fed for at least five months, and in most cases six to seven months is preferable. Calves also require a higher proportion of grain in the ration than the older cattle. A ratio of approximately one and one-half pounds of grain to one pound of hay is necessary if the calves are going to reach a market finish in five to seven months. They should receive all the grain they will eat. The yearlings should receive from one to one and one-fourth pounds of grain for every pound of hay fed. The two-year-olds will reach a satisfactory finish with a ration in which the grain and hay are fed in equal amounts by weight.

"The lighter weight, younger feeder steers have the advantage of a longer marketing period. The heavier, two-year-old feeder cat-

tle require too large an expenditure of feed per 100 pounds gain to permit keeping them in the feed lot for any extended period of time.

The market for which the cattle are intended should be kept in mind during the feeding period, so that the cattle can be finished in the way that the market prefers them. Cattle finished for the western market will not be liked in the east, and similarly, eastern types of beef do not do well on western markets. The eastern trade demands a more highly finished carcass than does the west. An animal fed for the east would be too fat for the west and would suffer in competition with leaner animals.

Wheat alone is not good as a grain feed. At least one-fourth or one-fifth of the grain ration should consist of bran or oats to lighten the ration and increase its bulk. The choice between oats or bran should be made on the basis of price.

One successful feeder favors the feeding of one pound of grain to each 100 pounds of live weight, plus all the good alfalfa hay the animals will eat. As the animals take on weight, the amount of grain per head will increase, but the basic formula of a pound per 100 should not be increased, he believes, until the last 30 or 40 days of feeding, when it can be raised to one and one-fourth pounds per 100 if the cattle are taking it well. In his experience, a weaner calf requires from 200 to 240 days of feeding. Yearling steers require from 120 to 150 days to top the market. Heifers will finish sooner than steers, although they may not make as much gain, nor as economical gain.

Finally, the success of a cattle feeding business depends upon the over-all plan of operation.

Plum-Cherry Hybrids

Based on his experience of 17 years raising plums in Renville County, Minnesota, Al Loffelmacher speaks a special word for the plum-cherry hybrids. They are hardy and productive, he says, and neighbors who come to the farm to get fruit show a preference for these types over several other kinds he grows. They come back and ask for more. His favorite is the Sapa, an established hybrid which cooks well and has a superior flavor. Sapa is early and is a dark-fruited cross between a Burbank Japanese and a sand-cherry-seedling selection. Loffelmacher has had only two years when he didn't harvest what he called a full crop.

—W. J. H., Successful Farming

The Next Step in Swine Improvement

Condensed from The Duroc News

E. F. Ferrin
University of Minnesota

PRODUCTION tests as the basis for the selection of hog breeding stock have received little attention in the United States. In Europe, all countries of consequence in pork production have programs for selection which place major emphasis on utility points. The widespread interest in production records is partly the result of the first World War. Certain nations seriously handicapped by a shortage of pork products during and immediately following the war resolved to become self-sufficient in future emergencies. The surest road toward this goal is a program which emphasizes economy of production and high quality of the finished product.

One fundamental difference in the attitudes of foreign and American swine producers is the greater emphasis placed upon type and attractive appearance of hogs in this country. Utility considerations are dominant in the selection of breeding stock, especially in northern Europe. This is indicated by the weak, sagging backs and broken-down pasterns of many of the animals of their superior strains. Such defects in form, probably unimportant when hogs are raised in close confinement, are serious for hog raising in the United States.

Some of our dairy cattle producers in the early days of production records attempted to build up herds solely upon the basis of high records. These dairy cattle did not meet with public favor and it was soon evident that both type and production should be emphasized. The remarkable success in dairy cattle improvement is proof that type and production are not antagonistic but can be reconciled. If American hog producers generally decide to use a production basis as one factor in selection, it is highly probable that type also should be given consideration.

The fundamental objectives of any program for production testing of swine are: First, high vitality and prolificacy; second, the greatest economy of feed consumption for gains in weight; and third, the highest market value of the carcasses. Two methods

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for obtaining production data have been employed in Europe. The first plan was perfected in Denmark as early as 1895 and has resulted in greatly reducing the cost of gains and raising carcass quality to a uniformly high standard. Essential features of this program are the designation of herds of approved type, known as breeding centers, and the testing of offspring from these herds. Four pigs are taken as a sample of a litter and fed to market weights at a feeding station. Complete carcass data are obtained after slaughter of three of the four litter-mates. Superior strains of breeding are selected on the basis of the feeding and slaughter records with prolificacy, type, and showring winnings considered. A similar program has been adopted in Sweden, Scotland and the United States to a limited extent.

The Survey method, commonly termed "pig recording" in Europe has become popular in recent years. More accurate data are obtained from the feeding stations, but the numbers tested are small in proportion to the cost of the program. In Sweden, pig recording is combined with milk recording, the same inspector gathering both series of data without duplication of expense. The pigs of each litter are identified by earnotching soon after birth, and litterweights are recorded when the pigs are 3 weeks of age. It is considered that at this age litterweights measure accurately the prolificacy and nursing ability of sows. Major emphasis in selection of brood sows is placed upon litterweights. Feeding station and carcass records also are obtained in Sweden but include a much smaller number of pigs.

Production records of sows in America have been obtained chiefly by the United States Department of Agriculture and the State Experiment Stations of Iowa and Minnesota. The method followed is similar to the Danish plan of obtaining accurate feed records of four pigs from a litter at a central feeding plant and carcass data of three slaughtered pigs. These records show clearly a wide variation in total feeds consumed for 100 pounds gain and considerable differences in the cutout values of the carcasses from different litters. Cooperation of leading breeders of purebred hogs has resulted in the testing of litters from many purebred herds as well as pigs produced at the Experiment Stations. It has been shown definitely that a considerable improvement both in economy of production and carcass values is possible by selection and building up of superior strains.

Rapid progress by means of feeding stations is not possible

under our conditions because of the relatively high cost per litter tested. But swine breeders have become interested in selection based upon performance and during the last few years, several herds have been developed by farmer breeders. The best example of what has been accomplished is the history of a Poland China herd in westcentral Iowa. This herd based its breeding policy upon results made by its entries in the Record of Performance program at Ames. The slogan, "Production Bred," has been advertised for several years and proof that the foresight of this breeder has brought results is shown in the good average of $55.60 at his recent public sale last November.

The plan of weighing litters at weaning time in order to select breeding gilts only from heaviest litters is gaining headway rapidly. The Austin (Minnesota) Swine Improvement Area is getting favorable attention all over the United States. At the University of Minnesota, litters have been weighed at 56 days of age each year for a period of 5 years. Litters of six pigs or more have been weighed whether or not weaning time coincided exactly with the age of 56 days. The average weight per litter for the spring 1935 crop was 221 pounds, while the average for the spring 1939 pigs was 245 pounds. This improvement of 24 pounds per litter is decidedly worthwhile, especially when the level of hog prices is low. This fall a litter of 13 pigs weaned had the remarkable weight of 510 pounds at 56 days of age. This is an average weight per pig of more than 39 pounds—an exceptional weight for so large a litter.

The Duroc Association has shown great foresight in establishing its Production Registry program. It is a program that will establish a basis for further breed improvement and will be a great benefit to every individual herd that participates.

Blueberries

Condensed from The Rural New-Yorker

Stanley Johnston

ON first thought, it seems strange that the blueberry, which probably was the most valuable native small fruit found in this country by the first settlers, should be left practically untouched, as far as attempts to cultivate and improve it were concerned, for nearly 300 years. However, there were at least three reasons for this situation. In the first place, the native blueberry was so widely distributed and produced so abundantly, that there was a constant supply of reasonably good wild blueberries available. Secondly, early atempts to transplant the blueberry from the wild state to gardens was almost invariably accompanied by failure and the plant attained the reputation of being difficult to handle. Finally, it was found to be rather difficult to propagate, and nurserymen preferred not to waste time on a plant that was hard to grow and for which there apparently was little demand.

Since the beginning of the present century, the wild blueberry crop has been rapidly diminishing. In northern districts where lowbush blueberry areas were once abundant, the second growth of timber has been protected so well from forest fires that the lowbush blueberry plants have been gradually crowded out. Farther south, where the highbush species grew naturally, many muck soil areas once occupied by these plants have been cleared and planted to other crops.

In 1908 the United States Department of Agriculture realized that the blueberry crop from wild areas was diminishing, and that this very promising native fruit deserved more attention than it had received previously. Accordingly, the late Dr. F. V. Coville started investigations on the problem and his findings regarding the soil requirements of the blueberry, and his success in producing varieties bearing fruit of exceptionally large size, laid the foundation for the cultivation of this fruit.

Another pioneer in the improvement of the blueberry who has made and is still making great contributions to the cultivated blueberry industry, is Miss Elizabeth White, of Whitesbog, N. J.

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As a result of the work started by Dr. Coville and Miss White, an important cultivated blueberry industry has been established and several hundred acres are now in production. Some New Jersey growers have started new plantings in North Carolina in order to supply the market with earlier berries. There is also a commercial blueberry development taking place in the Cape Cod section of Massachusetts and in southwestern Michigan, with smaller developments in other states. In all, probably 2,000 acres are under cultivation with a present average production of about 2,000,000 pints of berries, with the trend rapidly upward.

Interest in growing the improved varieties of blueberries has been growing steadily in recent years. While the growing of this fruit has many points to commend it as a valuable addition to our commercial fruit culture, it has very definite limitations which should be constantly kept in mind by the prospective grower. Most important essentials are a suitable soil and proper climatic conditions.

The soil must be acid—in fact, very acid. A PH. range of 4.4 to 5.1 seems to be best. (7.0 is neutral, 8.0 is alkaline, and 4.0 is very acid). If plants are set on slightly acid or alkaline soils they will make a very poor growth and are likely to die. Secondly, the soil must have proper moisture conditions for ideal growth. It has been found that a water level in the soil, during the spring months at least, of approximately 14 inches is best. Blueberry plants will usually survive a flooded soil for some time during the dormant season, but if too much water is present after active root growth starts, the plants are likely to be injured, and if the excess water is present for too long a time, the plants will almost certainly die. It has been also observed that plants growing in poorly drained areas are more subject to heaving, and are more susceptible to frost injury. Too little moisture, on the other hand, results in smaller growth and decidedly lower yields. If sufficient moisture is not available, the plants will fail to produce fruit buds. A very great deficiency will result in the death of the plants.

For commercial enterprises, it would undoubtedly be wise to select land naturally equipped with the proper moisture conditions rather than to select land deficient in moisture and to depend on irrigation.

The blueberry plant is almost always found growing naturally on sand or peat soils and soils of this type are to be preferred. However, it will grow satisfactorily on soils containing some clay, if sufficiently acid.

Blueberries can be roughly classified into two general types—highbush and lowbush. It should be emphasized that nearly all of the improvement work has been with the highbush blueberry, which is not found growing naturally in the more northern districts. Any attempts to grow the improved varieties of the highbush blueberry in areas outside of its natural range should be on a small scale and considered as entirely experimental. Frost is a serious menace to the blueberry crop. It is always more prevalent and serious in depressions or "pockets" and such sites should be avoided. Wide open areas of large size are to be preferred.

Methods of propagation have now been improved to such an extent that much more satisfactory results can be obtained than in the past. Plants are propagated mostly from cuttings made in the early spring of dormant wood of the past season's growth. They require special handling and are rather slow in rooting. The rooted cuttings are usually grown the next year in the nursery after which they are ready for a field planting.

A number of varieties of the improved blueberry are available and offer a succession of fruit over a period of almost two months. Among the most important of these are June, Cabot, Weymouth and Adams, for early berries; Rancocas, Stanley, Concord, Pioneer and Dixi for mid-season; Rubel, Jersey and Wareham for the late season. The prospective grower should investigate these varieties carefully to make certain that he is planting those best suited to his particular needs.

Planting distances vary from 8 ft. x 4 ft. to 10 ft. x 5 ft. The planting distance most commonly used in Michigan is 10 ft. x 4 ft. This planting distance requires 1,089 plants per acre. Two year old plants at present are generally selling for from approximately 25 to 30 cents each in commercial lots, depending on grade.

Once the plantation is established, cultural operations are somewhat comparable to those used with other bush fruits. The plants respond readily to proper pruning, fertilization and cultivation. During the first few years of commercial production, it was not necessary to spray, but at present the New Jersey growers are finding it necessary to dust for the control of the blueberry maggot, while in Michigan some dusting is being done to check the blueberry fruit worm. The necessity for spraying or dusting to control certain pests will no doubt become greater as time goes on.

Production begins in a small way the year after planting. A

yield of 1,000 quarts per acre may be obtained the fourth year under good conditions. Plants reach full bearing in from eight to ten years. Average yields in full bearing, under good conditions should range from 2,000 to 3,000 quarts per acre. The bushes are usually of very long life—some plants being known that are probably 100 years or more of age and in good condition.

The blueberry is a very popular fruit wherever it is known, both for fresh use and canning. It is famous for pies and muffins. Most cultivated blueberries are put up atractively in quart and pint boxes, covered with cellophane. A very large share of the crop in New Jersey, North Carolina and Michigan is sold through the Blueberry Co-operative Association which has established certain grades and standards which all members must meet. This has proved to be an orderly, efficient and satisfactory method of marketing. Prices have averaged about twice as much as for wild berries but, of course, growing and packing expenses are considerably higher for the cultivated berries.

Use Sawdust for Easy Way to Pick Poultry

Condensed from Eastern States Cooperator

John H. Lunn

SAWDUST picking started in rather a small way in the "heel" of Massachusetts, this area being located principally in Plymouth and Bristol counties east of Rhode Island and northwest of the Cape. Had it been developed in some other area it probably would have spread like wildfire across the prairie.

Coming to Bristol County Agricultural School in August, 1938, I found a great need for some good, practical, and speedy method of dressing poultry that could be taught to boys of vocational agricultural age and practiced by them at home.

The procedure is rather simple. The bird to be killed is hung by the legs from a cord. A metal washer or piece of leather on the end of the cord keeps a half-hitch from slipping—holds the bird's legs securely and is easy to release. The stick is then made, holding the bird's head with the left hand directly behind the two lower mandibles. The knife is first struck through the loose skin and turned with the cutting edge toward the neck and drawn out, exerting pressure as you pull it out. A good bleed is thus assured by holding the head just for a second while the blood

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spurts out. Turn the head over in your hand and brain-stick the bird through the eye or through the mouth, the eye being preferred because of its accessibility.

The primary and secondary feathers are then pulled out of the wings, also the main tail feathers. The bird is removed from the cord and submerged in water 127.5° to 129° Fahrenheit and held for thirty seconds. This, of course, is similar to the usual method of semi-scald picking. The temperature of the water can be varied with the different kinds of poultry being dressed: broilers 125° up to 128°; roasters 128.5° to 129.5;° hens 127.5° to 128°; stags 129°, and so on.

The bird is pulled out of the water, shaken to remove excess water, and then submerged in a box containing *dry, fine* sawdust. The bird is held in one hand while the other is used to shovel the dry sawdust over the bird and work it into the feathers. If the bird is pinny, a great many of the pins can be removed or rubbed off in the sawdust box. The bird is then again shaken to conserve the sawdust, and rehung on the original hook.

Picking is begun by holding the two wings of the bird with one hand and removing the feathers with the other. The breast is the most important part of the dressed product; therefore, we remove the breast feathers first. Rubbing the bird with sawdust causes the feathers to stand out in clumps, thereby enabling one to remove them quickly and easily. The next area to pick is the back. To do this the bird is held firmly by the wings with the back facing the picker. The hand is started at the base of the wings and moved upward towards the legs, removing all the back feathers with one sweep of the hand. The motion is carried on over the hip and up the leg. As the hand comes to the leg the thumb and forefinger form a tight circle around the leg, removing the feathers. Repeat this operation for the opposite side. The sawdust helps the hand and fingers to cling to the feathers and to facilitate fast picking.

The next area to be picked is the abdomen. With the neck in your hand and tipping the bird up, grasp the legs and expose the whole abdominal region. With a firm pat and rub on each side, what few feathers appear can be quickly removed.

The wings are next. The large primary and secondary feathers have already been removed, so all that remains are the small feathers that cling tightly to the web of the wing. By holding the tip tightly in your hand the feathers tend to stand slightly away from the skin, helped by the presence of sawdust. These are removed by a fast rubbing

motion with the thumb and forefinger on each side of the web. The small brush feathers that are found on the last segment of the wing are sometimes left to designate native dressed birds. The neck feathers are easily removed by making a circle with thumb and forefinger and drawing it toward the head.

In all of these operations skill must be obtained to acquire speed, but always remember that if you were sweeping a floor you wouldn't jump from one corner to another or the floor would never be swept clean. This principle applies closely to picking. If you skip from breast to leg, to back, to neck, and back to the breast without cleaning up each area as you go, a great deal of time is taken up with lost motion.

The procedure just related can be changed, if desired, but some definite plan must be followed on each bird if you expect to gain speed. One precaution, however, is to be rather hesitant in picking the upper part of your bird first, because it takes longer for the blood to leave the leg and hip areas, and serious blemishes may occur if the feathers are picked before the blood has left the muscle.

As soon as the bird is picked it should be thrown into a barrel of cold water. The barrel may be one having running water with a constant level overflow, or may be filled with still water with a chunk of ice floating in it. The ice is rather essential during the spring, summer and fall seasons to get the rapid cooling necessary for a good finished product. The birds are then removed and packed in ice.

The list of simple, inexpensive equipment to do efficient picking is a chain or cord to hang the bird on, a sticking knife, a tub, preferably 10-gallon or larger, an old kerosene stove or some other heating device, a box of fine sawdust, and a barrel of cold water. At the Agricultural School we have an electric immersion heater with a bar thermostat that keeps the temperature within the 127.5° to 128.5° range. A supply of sawdust can be obtained from any near-by planing mill, and the recommendation on that is to get as *fine* as possible.

Here's the question poultrymen always ask: "Is this method practical?" In answer to this question, is there any other method that can be set up as easily, as inexpensively, with as good results? It is true that a scald method of picking removes feathers more easily than our method, but who wants to buy the birds 30 minutes after they have been picked?

Good Cattle — Good Grass Go Together

Condensed from American Hereford Journal

Ira Clark

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WITHIN the lifetime of the few remaining veteran cattlemen of the Intermountain region there have been changes of such magnitude in the range livestock business and range conditions that to others who have not seen them, the story of these changes seems almost fictitious. These veterans have seen the grassy slopes and mountain valleys fill with livestock, and stock communities grow up almost everywhere. They have also witnessed a great decrease in the forage productivity of the ranges themselves.

In the Intermountain West, as in other sections, stockmen in early days regarded the western ranges as a vast reservoir of feed and thought they would always be adequate for the needs of their livestock. The livestock industry developed on a free-range basis, and little consideration was given either to proper season of use or to conservative grazing, since found so necessary to the perpetuation of the forage resources. As a consequence, many of the Intermountain ranges deteriorated sharply in productivity owing to too early, too heavy, or other unsatisfactory grazing practices.

The primary object of grazing management is not only to prevent further range deterioration, but to stablize range use at the level of maximum production.

The cattle industry had reached a high level by 1900 when, according to U. S. Census figures, there were approximately 1,000,000 range cattle in the Intermountain region. Following the turn of the century there was a gradual increase until the peak in cattle numbers was reached about 1919-1920 with more than 1,250,000 head of range cattle within the region. The next decade showed a small but steady decline in numbers till about 1930 when there were about 1,100,000 head followed by an upward trend since then until there are again nearly 1,250,000 head of range cattle. When it is realized that these cattle, together with approximately an equivalent number of animal units in sheep and other livestock, depend upon these ranges for 40 to 95 percent of their entire feed supply the

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paramount importance of range lands becomes evident.

Unlike many enterprises, in which business failures often can be traced to some single case of mismanagement, failures in the livestock business seldom result from any single cause. Range and livestock management practices together with the business methods employed in financing, marketing, and buying are usually all operative in the success or failure of the individual stockman. It is, therefore, doubly important that only the practices known to be best be employed by the stockman who hopes to make cattle raising a profitable and safe business.

Range forage types are not of such a nature and so distributed as to provide the right amount of spring-fall, summer and winter grazing to best meet the needs of the livestock. In the Intermountain states this is especially true, and for most parts of the region suitable early spring and fall range is rather limited. This limitation has helped to cause overgrazing on many of the spring ranges as well as for grazing other ranges at the wrong season, both of which have encouraged widespread plant cover deterioration and reduced forage yields.

Many stockmen have not given full consideration to the amount of feed available for livestock at different seasons of operation, nor have they, in many cases, attempted to make the supply balance the demand. The western rancher might well profit from the experience of Cornbelt farmers who each year feed out a large number of western cattle. Feeding practices do not follow set rules. They differ somewhat with locality and available feed. Generally, however, if feeder stock are well grown at the time of going into the feedlot they are put on full-grain feed as soon as possible and held there throughout the entire feeding period. Under these conditions gains from two to three pounds per day are made over a period of 150 to 180 days.

Younger animals which cannot be fed out to good advantage in one winter ordinarily are liberally fed through the winter on roughage with some protein supplement in order to make gains of about 1.0 pound per day or slightly more, and then carried through the summer on either good pasture or in the feedlot. Often pasture and full-grain feed is combined to get greater gains and better finish. These feeder operators have found that regardless of the age-class of stock going into the feed lot ordinarily the most profitable gains made are those made over the shortest period, and consequently that anything short of full feed is uneconomical in feeding operations.

With the growing scarcity of range and a general decrease in grazing capacity over much of the range area, the difficulties arising from a range failing to furnish sufficient feed for the number of animals grazed has not been fully recognized. Many western cattle now go to market smaller in size and in poorer condition than is profitable to the stock grower. Early stockmen record that so long as range was plentiful stock wintered well on the Great Plains and western ranges. Many of the cattle going into the winter thin would fatten to become good beef by spring.

As late as 1895 fat 1,000-pound steers were sold year round off the desert ranges of Wah Wah Valley in Utah.

The findings of Jardine, Lindgren and Potter in Oregon show even more clearly the value of ample feed in beef production than do the early accounts of range use in which they point out that: "A range will make maximum amount of beef per acre when there are barely enough cattle to consume the grass. A steer on an average range should gain at least a pound per day for every day he is out. One hundred steers would make 100 pounds of beef a day. Put 150 steers on the same range and they will gain one-half pound per day, or 75 pounds for the 150 head. Put 200 steers on the same range and they will gain nothing. Similarly, 30 pounds of alfalfa a day fed to one 800-pound steer will make a pound of beef. The same hay fed to two steers will keep them alive, but they will make no gain."

Maximum yields of range forage are dependent upon the individual plant making sufficient storage of food reserves to maintain a high vigor. For the most common range plants moderate grazing has not been found to decrease their vigor materially, though heavy utilization injures them. Management practices should recognize this and aim to provide for use at the proper season and for such degree of forage utilization as will allow for the removal of the maximum amount of forage with the least injury to the plant.

Proper season for grazing is important on all range type, and especially so for spring-fall and summer ranges. No set calendar date can be established as the time of range readiness. This date needs to be established each year by the stage of development reached by the important forage species on each range unit.

Grazing while plants are watery and lack substance, as is the case for instance with most common forage plants for a period of two weeks after growth begins, is not only highly detrimental to the soil and plant, but furnishes little feed to livestock.

In this stage of development it is necessary for a mature cow to gather approximately 80 pounds of plant material in order to meet maintenance requirements. Unless a range has an especially good plant cover of desirable forage it is difficult for a grazing animal, especially a cow that has wintered poorly, to gather enough early spring growth to remain in a thrifty and serviceable condition.

Weight lost during the winter or early spring grazing period is slow to be regained and net gains for the year are slight. Moreover, such loss in weight is further registered in a low calf crop by the failure of many cows to breed following a prolonged or severe period of malnutrition.

Much harm to both plants and soil results from grazing when soil is too wet. Plants are uprooted or badly displaced when the soil is wet, and as the soil begins to dry trampling results in compacting the soil so that it is less pervious to summer rains, thus creating a drier soil condition and inducing greater run-off and erosion.

A study to determine the effect of herbage removal at different stages of development was conducted on high summer range lands in Central Utah. Three series of vigorously growing plants of five important range forage species were established, each series being harvested on different dates to secure different stages of plant growth.

Delaying the period of herbage removal by successive 10-day intervals during the period of early spring growth resulted in increased yields of important range forages by 23 and 50 percent over each of two preceding periods.

The frequency at which plants are grazed during the season also has a marked effect upon forage yields. Any system of grazing which results in the nearly complete removal of the herbage four or five times in a season is extremely injurious and should be avoided. Mountain brome plants harvested five times in one season at monthly intervals did not survive the winter, and plants harvested four times in a season resulted in decline in yield of 88 percent, in contrast to the maintenance of vigor, and in some instances, increased yields for plants harvested only once or twice in a season. Wheatgrass withstood frequent harvesting only slightly better than did brome.

This reduction in yield due to early and repeated removal of the forage has been found to be a natural response of the plant. With resumption of growth in the spring a plant draws on the food reserves stored in the roots and crown the previous

year, and continues to do so until sufficient volume of growth is made to enable the plant to manufacture food at a greater rate than it is being used. Food reserves in roots and stem bases, with grasses particularly, reach a very low stage during active periods of growth, the minimum being reached when not more than 10 percent of the seasonal growth of the plant is made.

Maximum food reserves are stored in late season after reproductive processes are completed and while some late summer and fall growth is still being made. This stresses the need of a sufficient amount of forage being left un-utilized at the close of the grazing season in order that the plant can make adequate carbohydrate storage in the roots and basal stems to meet physiological requirements necessary to prevent winter killing and promote early spring growth.

Normal food reserve storage can be made in the case of mountain brome if the plants are not grazed closer than an average stubble height of about four inches. Indications are that slender wheatgrass and other important grasses respond similarly.

Grazing studies verify physiological findings. Plant cover has been preserved and many areas in rather poor condition have recovered in remarkably short time when proper season of use has been combined with conservative grazing. At the close of a 10-year grazing study on low foothill ranges in Colorado a pasture grazed under a deferred system which allowed the grasses to make good spring growth before being grazed had 36 percent more desirable grasses and 22 percent fewer weeds and undesirable forage plants than an adjoining pasture grazed continuously but at no higher rate of stocking.

Areas under management for only a four-year period beginning in 1933 at the Desert Range Station in West Central Utah now produce 2.3 times as much forage as did the adjoining unmanaged range. In addition to making this remarkable recovery over a period which includes one of the most severe drouth years on record—that of 1934—the managed range has yielded more feed each season than adjoining unmanaged range. During the last year or two the stock put on the managed areas in thin condition in mid-winter have made immediate gains and at the end of two months have been in thrifty condition.

Conservative grazing has been shown to yield greater returns per acre when practiced over a few years. On an experimental range at Miles City, Mont., pastures of different sizes were established and stocked with 20 cows in each unit, thereby mak-

ing one pasture heavily grazed, one moderately grazed and one lightly grazed, corresponding to 23.1, 30.5, and 38.8 surface acres per cow for year-long grazing. Some supplemental feeding was done during the drouth of 1934 and short periods of severe winter weather during the period, 1933 to 1935.

Over the three-year period the calf crop averaged 70.0, 86.7 and 76.7 percent with the calves at weaning time having an average weight of 194.5, 278.4 and 250.0 pounds, respectively, for the three above-designated intensities of grazing use. Average yearly calf production was 3,890, 5,569 and 5,003 pounds produced at a feed cost of 5.58, 3.64 and 4.16 cents per pound of calf weight, or at relative costs of 153, 100 and 114 percent for the over-grazed, properly-grazed and lightly-grazed ranges, respectively.

On an acre basis the pounds of calf yield per year was 27.4 and 25.3 for the respective properly-grazed and over-grazed range. The combined factors of greater percent calf crop, faster growth and greater total yield per acre, together with lower feed costs, gives a net gain at least of $4 per calf for the calf produced on the properly-grazed range over the calf produced on poor range.

In addition to low calf crop and greatly retarded growth, livestock kept on poor ranges commonly suffer heavy death losses often amounting to 10 percent for range cattle. In an occasionally severe year nearly all the increase is wiped out leaving no animals available for market.

An adequate feed supply for all seasons of the year is the first requisite to economical livestock production and stability in the cattle-raising industry. Proper stocking of range lands to provide conservative forage utilization offers the surest means the stockman, operating under western range conditions has of securing maximum calf crop and beef production per animal for a given ranch investment.

There are a number of range and livestock practices which the cattleman may employ to enable him to make more profitable use of his range than is being made. Adjusting numbers of livestock to the conservative grazing capacity of the range will probably in the long run often prove to be the most economical to the stockman whose available range is already badly deteriorated. Sometimes, however, other means than reduction in numbers, may maintain the range in good condition and insure nearly ample feed for all seasons of use. Among these are deferred and deferred-rotation grazing, supplemental feeding, grazing wild hay meadows in the spring, and additional use of temporary or permanent pastures.

Larger Grasses for Pastures

Condensed from American Agriculturist

Ford S. Prince

New Hampshire College of Agriculture

THERE is much interest among dairymen in the northeastern states in larger species of grasses for pasture. Timothy, orchard grass and smooth brome grass are being used to some extent in permanent pasture seedings, but the net result of a few years of pasturing is the gradual disappearance of the larger grasses with a corresponding increase of Kentucky bluegrass in the sward.

Research on how to maintain a stand of these larger and more productive grasses is now under way at various points in the world. German investigators have found that the lack of development of basal leaves in a grass is the cause of its disappearance under pasturing, while a species with an abundance of lower leaves will survive and eventually occupy the major proportion of the sward. On the other hand, if the same sward is managed for hay it has been found that the larger species crowd out those whose greatest leaf area is near the ground.

Utilizing these facts and applying them to pasture conditions, workers at the Welsh Plant Breeding Station have demonstrated that these larger grasses can be maintained in the pasture stand if it is properly managed. On plots seeded alike with orchard grass, perennial rye grass and wild white clover, but pastured differently, orchard grass excluded all the rye grass on one series in four years, while in another there remained practically a pure stand of rye grass and wild white clover. The orchard grass plots were pastured heavily from February to August, then rested the remainder of the autumn, and those ending up with rye grass were grazed the entire season, although grazing was always well controlled when practiced.

This seems to be ample proof that a larger and more productive grass can be maintained in the stand if farmers are willing to control their grazing sufficiently so that at some time during the year this grass has an opportunity to gain the ascendancy over the smaller species that naturally are better adapted to continuous grazing. It may be that by using

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these large grasses in separate fields each one can be held as an identity in its own location.

A little more study is necessary to establish how much grazing each of these larger grasses will permit, at what period they should be rested, and the like. But it is certainly a possibility, one that deserves the attention of farmers and research workers alike. And if at the same time, these more productive grasses are improved by selection and breeding so that they develop into strains that are more resistant to pasturing, better grazing conditions will soon come to our northeastern dairy farms.

Proven Sires Lead to Improvement

Condensed from The Poultry Item

Dr. C. E. Lee

FOR several decades the High Record Hen seems to have occupied too large a place in the thought and conversation of the average poultryman.

No doubt there has been some good done by trapnesting hens that were to be used as breeders but, personally, if I were starting a foundation flock, I don't think I'd care very much whether anyone had trapnested the birds I intended to try out as breeders or not! What I would want would be the egg records of the daughters of these birds and if possible I'd like to get trapnest records on all the daughters that hatched from each mating, not just the best of them. Furthermore, I would like to have the hen mated with two or three different males during the year and these males mated with other hens too so that the value of each individual could be better calculated.

Prof. Gowell at the Maine Experiment Station, many years ago, found that trapnesting a flock of Barred Rocks and breeding from the best layers year after year did not result in any increase in egg production. And in spite of the fact that Dr. Raymond Pearl, at that time connected with the Maine Experiment Station, published in 1910 a paper on the breeding of dairy cattle, which pointed out the necessity of adopting some type of "progeny test" breeding program, the majority of poultrymen, like the majority of dairymen, seem to have gone on breeding by pedigree and with the pedigree evaluated on the basis of production of the females themselves and not of their

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daughters, except incidentally and individually as they appeared in a single individual pedigree.

Petrov at Cornell in 1935, analyzing the records of a flock of White Leghorns at Cornell University concluded that all advance shown in egg production from 1917 to 1927 occurred entirely as the result of the improvement during this period in maintenance, rearing, and other environmental conditions such as feeding, etc., rather than as a result of breeding.

It has been demonstrated again and again not only by many scientific workers, but by practical poultrymen, that the record of a hen cannot be used as any indication whatever of her ability to produce daughters that will lay any particular number of eggs, even very approximately.

Neither can the record of egg production of the sires' dams be used as a safe indication of the breeding value of the sire.

The value of a sire may not be known except from the records of his daughters. By the records of the daughters produced from a large number of matings, we can check on the approximate value of the sire as a breeder. It is not, however, possible to determine the results that will be secured by the mating of this sire to any particular hen in advance, unless we have a considerable number of daughters already produced from this same mating.

Dr. Hagedorn, the well known Dutch poultry scientist, has sponsored a breeding program in Holland which selects breeders on the the basis of the production of the progency without ever bothering to trap the hens used for breeding during their first laying year at all. When a mating is found which gives high production and other desirable characteristics the birds involved in the mating are retained and used as long as they are vigorous and healthy.

The value of a mating is not in the production of one or two phenomenal individuals but rather in the ability to produce a uniformly good offspring. Individuals selected for breeding should be selected on the basis of their ability to produce a large number of progeny which give high performance and, in order to test this, it is of course necessary to retain and raise every bird that lives from each mating.

Progeny test breeding, particularly by the "sib" or family method is not a job for the average poultry breeder, being both too difficult and too complicated.

As a matter of fact, nearly 30 years of observation of this commercial industry has convinced the writer that what we need in this country are a relatively few large breeding farms which will apply sound scientific methods

to the production of better stock which may then be "duplicated" by the other 99% of the so-called "breeders."

There are too many poultrymen who are trying to carry out elaborate breeding programs and who are failing either because of lack of scientific training and knowledge, or lack of capital, or both. Many of these same breeders, however, could make a satisfactory income, and be of greater service to the poultry industry, in our opinion, if they simply carried on the reproduction of a well-bred strain, going back to the source from year to year, as necessary, for a little seed stock to keep their breeding flock up to par.

One difficulty today faced by all breeders is that of getting a price for their chicks, in sufficient numbers, to pay their high overhead cost of breeding and give them a decent income. If we restrict the number of real breeding farms and let the rest be just "reproducers," there will be no difficulty for the smaller number of real breeders in securing a fair price for their stock.

Quick Flock Improvement

Assuming that you have a flock and wish to breed from it with reasonable assurance that you will get a quick improvement, how should that be done?

Unquestionably, the best way is to select 15 or 20 hens, 15 if you are dealing with a heavy breed and 20 if you are dealing with Leghorns, and then buy a progeny tested sire to mate with them.

It is true that this progeny-tested or "proven" sire may not do as well with your particular hens as with some other strain and so of course he can't be said to be actually "proven" until you have tried him with your own birds, but if he has been found outstanding prepotent on other hens, even of a different strain the previous year, it is likely that you will find him a valuable breeder with at least some of your females.

Let's see what we might expect in differences between the daughters of different sires, taken on more or less of a flock basis. Below we show table given by Dr. F. B. Hutt, of Cornell University,

Males	Hatch per cent	Per cent of mortality			Eggs to Jan. 1
		On range	To Jan. 1	To Apr. 1	
13	80	19	15	28	36
14	79	21	24	37	40
101	90	5	7	14	34
16	81	5	8	14	61
1	79	12	30	39	57
11	77	30	58	67	23

in his address before the conference on the National Poultry Improvement Plan in Chicago last year.

It would certainly make many dollars difference to the poultryman whether he used males of the breeding quality of No. 11 shown or of the breeding quality of No. 16. All these chicks ran together on the same range and were spread through the same hatches so that the differences must be interpreted as due to inheritance.

Below we show a table from the records of Pennsylvania State College, furnished through the courtesy of Dr. D. R. Marble, Poultry Dept., showing the comparison of the progeny of six different males.

Again we can see that it would make a considerable difference to a poultryman's income whether he secured males having a breeding quality as shown by sire W-2m instead of sires of the quality of W-5m. The first sire produced only 57 pullets, these took 180 days to mature, on the average, and while they showed an average egg production of 200, the per cent of birds which had to be taken out was 28.1% while the second sire produced 117 daughters which took only an average of 168 days to mature, produced an average of 231 eggs per bird and showed a flock reduction of only 17.1%.

It is quite true that we cannot afford to over look the feminine side of the family, but it is quite apparent that one of the best, and certainly the first step, that a young pullet could make toward fame would be to pick the right grandfather!

For greatest and surest improvement in flock production, put your money into proven sires, birds which have been progeny-tested.

Comparison of All Progeny of Six Different Plymouth Rock Sires Used in Matings, Spring of 1938

Sire No.	No. Progeny Housed in Laying Pens	Av. Body Weight at First Egg Pounds	Av. Days to Sexual Maturity Days	Av. Egg Production Eggs	Av. Egg Weight Ounces	% Flock Reduction Per Cent
T-28m	102	4.7	176	235	23.7	24.5
W-2m	57	4.9	180	200	23.9	28.1
W-3m	105	5.2	185	213	24.2	20.0
W-4m	62	5.4	191	197	25.3	19.4
W-5m	117	5.0	168	231	23.8	17.1
W-6m	28	4.8	175	227	24.1	17.9

Steel on the Farm

Condensed from New England Homestead

TRAVELERS through the Middle West this fall have been started by literally thousands of galvanized steel grain bins popping up apparently overnight on farms, near elevators, and at way-stations along railroads.

Faced by a demand for storage space in its grain marketing program, the government chose galvanized steel as the material from which the storage buildings were to be constructed. Fabricators of steel buildings broke all records in the rapidity with which these more than 40,000 units were produced; the simplicity and ease with which they were erected on the site made possible another record; so it is no wonder that observers rubbed their eyes at the sudden transformation that developed.

These bins were fabricated from strong 20 gauge steel which carried as heavy a coating of zinc as could be put on and still withstand the required formations. The bins are circular in shape; the walls are of steel; the roof is of steel; and the floor is of steel.

While designed and built to meet more or less temporary emergency conditions, there is no doubt but what these steel bins will give long years of satisfactory service; for in addition to being correctly designed from a structural and functional standpoint, the fact that they are of steel makes them fire-proof, lightning-proof, rat-proof and rot-proof; and they are likewise practically rust-proof because of their heavy coating of zinc.

The purchase and erection of these thousands of buildings for grain storage purposes is in itself a story of tremendous interest to our great grain producing regions; but farmers everywhere will find a special interest in it because it represents what is by far the most extensive application of steel to farm building construction that has ever been made.

Steel is far from being a stranger on farms. In the form of galvanized sheets it has been widely used for roofing and siding purposes in all kinds of buildings, and it has also been used in the manufacture of a wide variety of farm machines and equipment. In all of these uses steel has given an excellent account of itself, and its further use is spreading by leaps and bounds.

For example, take poultry house construction. Probably ten years ago it would have been

Reprinted by permission from the New England Homestead, January 27, 1940, Springfield, Mass.

difficult to find a galvanized steel sheet in any kind of construction on a poultry farm; now, all through the East, poultrymen have come to an appreciation of the value and economy of steel, and possibly half of the construction on poultry farms today involves the use of metal. One company reports that out of 205 inquiries which came into its office from the rural field, 180 were direct requests for specific information on how to use galvanized sheets in poultry house construction.

With a broad increase in the use of galvanized sheets thus indicated, it behooves the farmer to be well posted on what to look for when he is buying them.

In the first place, there is the gauge or thickness of the metal. The gauges commonly used for farm building construction are No. 28 and No. 26, with No. 24 used where extra strength is required. The smaller the gauge number, the thicker, heavier and stronger the sheet.

The next thing to know is that galvanized sheets are sold in different shapes or styles such as corrugated, V-crimped, weather-board siding, and other special shapes.

In most corrugated sheets the corrugations are either 2½" or 1¼". Sheets with 2½" corrugations are made in two widths: the 26" width has both edges turned down and when lapped one ridge or corrugation over the next sheet, makes very satisfactory siding. If 2½" corrugated material is to be used for roofing, be sure that it is 27½" wide, with one edge turned up and the other down, so that it can be lapped one and a half corrugations to make a tight joint. V-crimped sheets may have either 2, 3, 4, 5, or 6 V's or crimps but the 5 V-crimped sheet, with 1 V in the middle and 2 at each side, is probably the most satisfactory for general use. All sheets cover net 24" wide, which is the usual spacing of studs and rafters when sheets are to be used.

Galvanized sheets in various forms are available in different lengths, by even feet, from 5 feet up to 10 feet; and for a very small extra charge, you can get sheets 11 or 12 feet long.

The weight of the zinc coating in galvanized sheets is a very important factor so far as durability and rust protection are concerned, although very few buyers seem to know anything about this and seldom specify the weight of zinc coating when they buy sheets. The commoner sheets available carry what is known as the standard "commercial" coating, which is from an ounce to an ounce and a quarter of zinc per square foot. Such a weight of coating will prevent rust for a reasonable time but if a little

extra money, say 10 or 15%, be spent in getting the heavy Seal of Quality grade, with a two-ounce coating, such sheets will last practically a lifetime without rusting.

Practically every company that produces galvanized sheets can supply directions for applying them correctly; but the trouble is to get these directions into the hands of the users. There are a number of little points in application that should be carefully observed.

First, remember that galvanized sheets are not recommended for roofs of low pitch; for if snow and ice accumulate on them, moisture as a result of melting next to the sheets, may back up in the joint and cause leakage. However, this difficulty can be overcome by laying a thin strip of asbestos wicking (such as is used for packing valve and pump glands) in between the sheets at the lap and nailing them down with an adequate number of nails.

Both corrugated and V-crimped roofing can be laid over old shingles or old composition roofing or on nailing strips across the rafters, or directly on the rafters; but in the last case 2 x 4 headers, staggered for easy nailing, should be set in between the rafters. The spacing of these headers, which are for the support of the main body of the sheets, should not be over 18 inches on center for No. 28 gauge sheets and not over 24 inches for a No. 26 gauge sheet. In the case of old shingle roofs, it is much better to remove the shingles and re-nail the sheathing, which may be found to be loose.

A common way to support galvanized sheets is to nail strips or "roofers" across the rafters. These should be either of 1¼" hardwood boards or 2 x 4 softwood planks, either of which should be properly spaced according to the gauge of the sheets as indicated above. When this construction is used, fasten pieces on top of the rafters between the nailing strips, and of the same thickness, so as to give the side laps of the sheets solid support and a good hold for the nailing.

Nailing is most important. Use only special roofing nails, heavy zinc-coated, to protect them against rust. Use lead washers under the heads of plain nails. More convenient than plain nails and lead washers are the special roofing nails made with lead under the head and down the shank so that when the nail is driven, the hole around it is tightly plugged with lead to make a perfect seal against the ingress of moisture. If you want your roofing to stay in place permanently, use nails with drive screw shanks which cost but little more than straight shank nails and which tests have shown to give

greatly increased holding power.

Drive the nails through the tops of the corrugations—not in the valleys. Do not drive the nails so deep as to fatten the corrugations. The spacing of the nails so deep as to flatten the corshould be from 6 to 8 inches, while at the ends the spacing should not be over 5 inches. Usually, with sheets of No. 28 gauge or heavier it is not necessary to nail over the central area.

Start laying the sheets along the drip eaves at the end of the building opposite the direction of prevailing winds so that wind and rain will blow over the laps and not under them. If possible, use different lengths of sheets so as to stagger the end laps on adjacent rows. It is usually more convenient to lay the sheets in complete vertical rows, starting at the lower eave and working toward the ridge. For finishing the peak of a roof use heavy-coated galvanized ridge roll. Special galvanized forms are made for use at the breaks in gambrel roofs; they fit under the top sheet and over the lower one and when properly nailed, prevent leakage at the break.

Galvanized roofs when securely applied and properly grounded provide excellent lightning protection.

For the grounds use approved conductor such as galvanized pipe, rod or cable, weighing not less than 5 ounces per foot of length, heavily zinc-coated, one at each of two diagonally opposite corners of average rectangular buildings; or on long buildings, put grounds at intervals of not to exceed 100 feet around the building.

Where both galvanized steel roofing and siding are used connect the roof and the sides by means of proper conductors. Full directions for grounding metal roofs for lightning protection are given in Farmers' Bulletin No. 1512, obtainable from the U. S. Department of Agriculture, Washington, D. C.

Although steel in the form of galvanized sheets is used so well for roofing and siding, it can also be used for the framing members themselves. Several companies are featuring the manufacture of such buildings and their use is rapidly extending. Steel angles and beams of various shapes are used to form these metal frames, and like the sheets, are heavily galvanized to protect against rust.

Practically every kind of a farm building that anyone may need can be obtained in all-steel construction. Not only grain bins, but poultry houses, swine houses, garages, storage houses, machine sheds, and barns for any purpose are available. These buildings are usually shipped in sections and can be easily and rapidly assembled right on the job.

Self-feed Lambs for Profit

Condensed from The Farmer

Richard Davids
Livestock Editor

CORN can now be safely self-fed to lambs—and that is the answer to feeders who for long have known the benefits of self-feeding, but who dared not run the risk of losses which often followed the practice.

The question has been how to dilute corn with feeds that would lessen the danger of death losses. The Morris, Minnesota, School and Station with P. S. Jordan in charge, set out to settle the problem in a series of experiments from year to year, and presented it to the public at Lamb Feeders' Day, January 13.

Last year's work pointed out that lambs on self-feeding made greater gains than those hand-fed, and at less labor cost.

Corn may be safely diluted or mixed with as little as 25% oats or as little as 20% chopped alfalfa hay, this year's trials show. When lambs were hand-fed for about 20 days and were eating an average of slightly more than two pounds of concentrate daily, none of them suffered from being shifted over to self-feeding. Two out of the three deaths among the 240 experimental lambs came from a pen which was getting a more concentrated ration of corn than is recommended for safety—90% ground corn and only 10% chopped alfalfa hay (the unsuccessful ration).

Will a diluted corn ration make satisfactory gains? If the oats do not exceed 25% of the grain ration, or the chopped alfalfa hay exceed 40%, very good gains result, and the lambs will take on a good finish. In general, the quickest gains and greatest profits came from pens which were fed the greatest proportion of corn, providing, of course, that the ration did not go beyond the limits of safety. More of the mixture was eaten as it became leaner with corn and richer in hay.

One yard of 30 lambs answered the question as to whether it would be wise to feed whole alfalfa hay along with the self-fed corn and chopped hay mixture. The rate of gain, the cost of gain, and the profit per lamb all were in favor of the yard where no additional whole hay was fed. Lambs which were self-fed the mixture of chopped hay and grain

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gained 5 pounds daily; the other lot, which was fed whole hay in addition gained .47 pounds. The cost of 100 pounds of gain in the first pen was $4.11; in the second, $4.33. It would seem that when the ration was as high as 40% hay, there was no advantage in feeding whole hay.

Whole corn mixed with whole oats proved to be an entirely safe ration for self-feeding after the 20-day hand-feeding period. The lambs remained on feed well. There was little difference between the performance of lambs which were fed ground and those fed whole grain, except a slight advantage in favor of the whole grain.

When oats were compared with chopped alfalfa hay as a means of diluting corn to make it safe for self-feeding, oats came out behind. Lambs liked the hay-corn mixture better than the oats-corn, consequently they ate more of it. The cost of a hundred pounds of gain, with oats figured at 28 cents a bushel, and alfalfa hay at $8 a ton, was a little in favor of the oats with the profits per lamb averaging about the same. Where no hay was fed besides the mixture, the advantage in rate of gain, cost of gain, and profit per lamb was all on the side of the chopped hay.

Lambs liked very much a ration of straight ground wheat screenings, and made gains which compared quite favorably with any of the other rations. The screenings were not as efficient a feed as the corn and oats, and lambs had to eat 586 pounds as compared with 440 pounds of corn and oats to produce a hundred pounds gain. However, since the lambs ate more screenings daily, and because of the low cost of the feed, the screenings lot returned a margin of $1.15 a lamb profit over feed, the best profits of all the experimental groups. Whole hay was fed in banks. The screenings were also self-fed.

There is, however, a lot of difference in screenings, and these were particularly good, weighing 48 pounds to the measured bushel, and containing only 4.7% inert material and dirt. The screenings were ground in a hammer mill. When screenings are ground too fine, lambs don't like them.

Feeding screenings opens a new idea in economical lamb production. When carefully ground, they are not a factor in spreading weeds, and conserve a valuable source of feed.

The oats and corn used in the experiments were run through a burr mill. They were not very finely ground, since too much dust may result, and lambs will not eat it as well as coarser grain. The shelled corn and hay were run through a roughage mill with a cutting blade and a half-inch

roughage screen. Barley might have been used in place of the corn, and has about 85% the same efficiency. Rye would have been sateisfactory if it did not contain too much ergot.

What if a man did not have good quality alfalfa hay to feed? In such case, feeding oilmeal has been found to be a good investment, both in last year's experiments and in actual practice. With good quality alfalfa, oilmeal is not important.

The Spinner is Right

Condensed from Southern Agriculturist

F. O. Montague

IF we draw a line from the mouth of the James River at Norfolk, Virginia, west through Cairo, Illinois, to Oklahoma City, and south through Central Texas to the Gulf, we have enclosed the region where three-fifths of the world's cotton is grown. It is the most widely useful of all our fibers. From it we make most of our clothing —more than we get from all the wool, silk and linen put together. It is used in making the films on which our motion pictures are photographed. It goes into the making of our most powerful explosives.

Up to recent years exports of raw cotton exceeded in value any other single export in the United States. Of the annual crop, ranging from 10 to 18 million bales, more than half is usually exported. Much of it goes to England—the world's greatest cotton spinning country—and to Germany, France, Italy and Japan.

Cotton prices vary greatly from year to year, due to changes in demand and production. America faces strong foreign competition which has been greatly encouraged from time to time by short American crops, and in more recent years by attempts at controlled production in this country. Another cause for the increase in this foreign production is the tendency on the part of American farmers to grow the less desirable, shorter staple cotton. The American cotton farmer has been laboring under the impression that the shorter staple cottons produce more lint per acre, which has not been borne out by the facts. Another major cause of the large amount of short staple being grown in this country is the unjust practice on the part of local buyers who have used the vicious "hog round" method of buying cotton, which pays just as much for weak, rotten, dirty ½-inch

Reprinted by permission from the Southern Agriculturist, Feb., 1940, Nashville, Tenn.

cotton as for the desirable inch and better cottons with the character and spinning qualities that are in demand.

Only in the last few years have American growers begun to think of cotton that is produced in foreign countries. We knew, of course, that some cotton was grown in India, China, Egypt, Russia, Africa, and certain countries in South America, but just how much and what kind seemed unimportant to us. It was only when our exports began to decline that we became concerned.

Foreign production is now about twice as much as it was 15 years ago. As the production of foreign cottons increase, export of American cotton declines. Our exports today are not much over 5 million bales per year.

Our foreign competitors, who in recent years have increased their production, are doing a good job of pleasing customers. There has been a feeling in the American trade that the desire of the customer is not important. We have sold millions of bales of cotton abroad largely because our spinners could not get the cotton they wanted from other countries, but today some of our customers are trying foreign cotton and find that they like it.

This is only part of the story. Much of our cotton is ginned wet and is badly gin cut. The damage to a wet bale may amount to as much as $5.00. The spinners, our customers, don't like damp, gin-cut cotton. Then there is the matter of the "mixed bale" and no customer likes a "mixed bale." They call them "false pack" which includes "plated bales," "two-sided bales," "gin-cut bales" and "country damaged bales." We can't expect to continue selling a customer cotton he doesn't like. We must stop harvesting wet, dirty, short, weak cotton and jamming it through the gin in record time, while every handler cuts great holes through the bagging and pulls large, unnecessary samples.

How do they handle cotton in other countries? Let us look at Brazil for an example. In the first place, they grow their cotton from an American upland seed. Its staple is an inch or longer and it is grown in one-variety communities. Practically speaking, they have only two main varieties of cotton in the chief cotton growing sections. It is ginned by a gin made in the United States and set up by Americans. At each gin there is a government agent whose duty it is to see that no mixed bales are ginned. He has a great deal of authority with respect to what the ginner may do. He draws a sample from each bale and forwards that sample to a central Government grading office where it is classed and an official certificate issued.

The Brazilian bale is completely covered—sides, top, bottom and both ends. As it moves along the channels of trade it is not subject to cutting, slashing and sampling as is done in this country. It reaches the spinner in much better condition and without the common losses to which we have become so accustomed. And when we consider that our foreign customers have the same desires as other customers, we can't blame them for buying cotton as the Brazilians handle it.

What is the solution to the problem of supplying the spinner with the kind of cotton he wants? Briefly, the answer is to produce a uniform staple of an inch and better in sufficient quantities to supply the trade. A start has been made. The one-variety community is the biggest step.

Here are some of the things to be done with this one-variety community movement to make it successful: (1) Have the kind of cotton the spinner wants. (2) Handle it in such manner that its value is protected. (3) Sell our cotton on the same basis as other countries. (4) Growers must receive the full value on the cotton they grow. Spinners pay more for good cotton but farmers many times do not receive more. Here again is why the "hog round" buying of cotton should be eliminated for all time to come. When farmers receive premiums for staple they will gladly grow staple cotton as a regular practice.

There are a few things to be watched carefully if we are to make these one-variety communities work. All growers must select one variety of cotton, plant the best seed available and keep it good year after year.

Here are some things the individual farmer must do: (1) Take only dry cotton to the gin, because the ginner cannot do a good job unless you haul ripe, dry cotton to his gin. (2) Avoid unnecessary trash and dirt in picking. (3) Pick cotton before it is weather damaged.

And here are some things the ginner must do: (1) Gin separately the cotton of members. (The members can have their own gin, which is most satisfactory, or have certain gin days each week at the public gin.) (2) Clean gin thoroughly in preparation for special gin days. (3) Gin with loose seed rolls. (4) Use proper saw speeds.

After the cotton is in the bale the next step is to find satisfactory markets. After members of a one-variety community have produced cotton of improved quality and have carefully preserved that quality through various stages, how can they sell the cotton for full value?

First, they must determine what kind of cotton they have to

sell. Second, they must secure competitive bids from buyers who have a demand for the type of cotton offered. Third, they must have a market representative in the organization who is responsible for marketing functions such as handling samples, securing bids, selling, shipping, keeping records of producers, and distributing returns to growers.

This one-variety community approach of our problem of cotton production, in all its phases, is the best plan yet presented in the growing and disposition of American cotton. Farmers will do well to look into the possibilities and then act as a group. This "rugged individualism" in growing cotton is as out-of-date as it is in most all other lines of endeavor. Group action is needed and must be forthcoming as never before.

Unground Feed for Lambs

That there is not much, if anything, gained by grinding hay and grain for lambs is shown by recent feeding experiments conducted at the Nebraska Agricultural Experiment Station. It was found that lambs fed ground alfalfa hay and ground corn gained 100-pounds weight on only 30 pounds less corn and 51 pounds less hay than those fed unground corn and hay.

Grinding of feed for lambs, as is indicated by the experiments, can be done at a profit only when the cost of grinding 450 pounds of alfalfa hay and sufficient corn for 100-pounds gain can be done for less than the combined value of 30 pounds of corn and 51 pounds of whole hay.

Cracked kaffir showed no advantages over uncracked grain. The same amount of feed was consumed and the same gain was made in comparative feeding tests.—*I. M. Howard, Successful Farming*

Facing 1940 in the Poultry Business

Henry J. Beckman

WISE men turn back the pages of the past to find guidance for their operations in the future. With the experience of 1939 still a bitter memory, the careful poultryman will now turn to the records of the past to help determine his course for the year just ahead.

A careful study of the factors that made 1939 the difficult year that it was for poultrymen will do much to relieve the pessimism which may otherwise prevail and may provide a basis for far more successful operations in the year just ahead. In the beginning of 1939 poultry specialists and statisticians predicted an unusually heavy hatch of chicks and urged producers to curtail their operations lest an overproduction of eggs and poultry products prevail. In spite of this advice producers raised the largest number of birds in many years.

Coupled with the heavy hatching of chicks and the consequent large increase in the number of hens, is the fact that, for the past five years, the quality of laying hens has been steadily improving. The combination of these two facts resulted in such a large increase in the production of eggs that the consuming public could not, or at least did not, purchase the eggs at a satisfactory price. As a result, by the end of 1939 the decline in price compared to the end of 1938 was fully 33⅓%.

Further analysis of these two factors is enlightening. The increase in the number of chicks hatched in 1939 over the year 1934 was 78%. While the increase in the number of eggs laid per hen goes back over a longer period, it is significant that in 1925 the average hen in the United States laid 90 eggs, while in 1939 she laid 106 eggs, or nearly 20% more. This increase in laying capacity when considered with the increase in the number of hens, makes for a larger total increase.

Few people, not familiar with the total agricultural picture in a country so large as the United States, have any conception of the significance of even a small increase in so many producing units. Perhaps no agricultural product is more generally produced on so many farms as are eggs and poultry. There are about 6,000,000 farms in the United States and 5,600,000 of them, or more than 93%, produce some poultry and eggs,

either for home or for commercial use. It is obvious, therefore, that even a slight increase on each farm would mean an enormous total increase in egg production. When such increase comes quickly, as it did in 1939, and the public has not been educated to use more of the product, only one result, namely lower prices, can prevail. This is just what happened in 1939 and the poultrymen in some sections of the United States found themselves at the close of the year in the worst relative position, so far as the egg-feed ratio is concerned, that they have experienced in the past thirty years.

With such conditions for the immediate background, we now face the new year with some definite facts arising out of past records that lend optimism to the small or average producer. The first of these is the fact that invariably after a year of low prices there is a sharp decline in the number of operators the next year. Usually, too, there is a marked curtailment in the hatchery output of baby chicks. Both of these facts usually have a very definite effect upon the price of poultry products within the next twelve month period. Egg prices respond quickly to the supply, and any lessening of the supply available is likely to result in better prices to the producer almost immediately.

Another thing to keep in mind is that the producer who does most of his own work can generably produce a certain number of eggs at a lower cost per dozen than can the commercial producer who must necessarily hire a large part of his labor. While a labor bill may not be hard to meet when the margin is wide, it may prove to be exceedingly difficult to meet when the margin is reduced. Inasmuch as the poultry business is in a large measure a means of selling one's time profitably it is evident that when that cannot be done at a profit the man who simply makes poultry a sideline has a marked advantage over the commercial man who depends entirely upon poultry for his income and must charge all his overhead to that business.

With the records of the past showing the sharp declines in the supply of eggs that have usually followed years of large production and low prices, it is reasonable to assume that the year 1940 may be a year of much smaller egg production, and the wise poultryman may well take this into consideration as he lays plans for a year that many experienced producers believe has better prospects for the average poultryman than the one just past.

Produce a Salable Riding Horse

Condensed from The Horse

Bill

THE day he hits the ground is the ideal time to begin gentling the foal. The earlier in life the foal is haltered, led and gentled, the easier it is to doctor him and keep his feet leveled. The gospel of "the level foot" needs more converts and closer adherence by believers. The foal will wear his feet off on the rocks, but unevenly, and nature must make an appropriate adjustment. This usually shows up in the form of a crooked, bony column in either front or hind leg or a stretched tendon.

An easy way to teach the very young foal to lead (if the mare is not wild) is by running its halter rope through the dam's halter ring and having both mare and foal driven, with a whip if necessary. The foal naturally will wish to keep up with the dam and the fact that the rope is movable through the halter ring will provide the hand who is doing the leading with the necessary "give" to prevent injury to the foal if he should pull back. Those in a later age-group are generally hackamored and allowed to drag a rope for several days, thus practically halter-breaking themselves. At this age, some prefer a rope around the thighs, while others prefer tying the colt to a burro. Which ever method is adopted in halter-breaking, the principle of not tying to a solid object must be observed or heads will be pulled down and the risk of bad rope burns incurred. A method which I think the cleverest I have ever seen is to attach a swivel to an overhead cable (one end of which may be tied to a tree limb to provide "give"), then to drop from the swivel a rope to which the hackamored colt is tied and left. As the colt fights, his forefeet lose the bracing power which makes possible a pulled-down head, and when he gives in, the pull on his head ceases. After a few hours of this, during which man has been in no way associated with his troubles, he is halter-broke and usually fatigued enough to accept a saddle.

After halter-breaking, whatever the age, slowly gain the colt's confidence until you can pick up and pound on his feet, pet him anywhere and have him stand quietly on the hackamore. The latter is important from a

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disciplinary standpoint in later training. After a winter of feeding and gentling as a weanling, aside from treatment for injuries and foot leveling, let him alone until the next winter when further gentling may be followed by riding, if light riders are available. The ill effects of putting the average-sized man up on a long yearling may not at first be noticeable, but his future usefulness or value will be impaired.

Whatever the year of the first saddle, try to *prevent the first* pitch. Get him tired before saddling the first time (in the chute, if necessary); let him become accustomed to the feel of the saddle by leading him with it on during several daily periods of an hour or more, or let him wear an old one in the corral, but don't let his back get tender. If you expect to use a bit later, be sure it is a limber (snaffle) bit and keep it in his mouth during the leading periods. Here, it is emphasized that earing should never be resorted to when any other method less destructive to the horse's disposition is available. In this case it appears to be the lesser of two evils *(ear with tact* or accept the first pitch), so when you think he is ready to ride, tie him up close to the saddle horn of a sensible snubbing horse, ear the colt and let the rider ease into the saddle, move forward retaining only the necessary amount of twist on the ear to prevent pitching and release it when it is evident that the colt has accepted this new experience. If everything goes as it should, slowly ease off on the snubbing rope as you keep moving forward. When the lesson is complete and the rider is ready to dismount, repeat the snubbing and earing routine used in mounting. This routine is seldom needed more than twice. During the second lesson, when the colt is leading quietly, release the snubbing rope and let the colt follow the snubbing-horse while his rider teaches the colt the feel of his legs and reins. This sounds like a long operation, but try it and it will be found that after a few careful lessons you will have a horse which has never pitched and probably never will if reasonably good judgment is used in his future handling.

The next step is to continue the colt's training as an individual. *Do not permit abrupt stopping and turning at this time.* Hundreds of potentially good horses are ruined by trying to make them handle as two-year-olds. The colt's joints do not harden, nor do his tendons and ligaments mature until he is a three-year-old. During the two-year-old year, then, teach him discipline; teach him to start and stop pleasantly, but not abruptly; work him at all gaits *on the*

straightway and always on the hackamore or limber bit. Let him have his head and teach him to put his head down into the bridle. This is the period of muscular elongation and cramped muscles will not properly develop. During this period, the balance should be on the forehand (ahead of the cinch). There is plenty of time later to collect him. Remember that the horse balances himself with his head and neck; so afford him the opportunity to develop, under conditions of relaxation, the new balance required by the imposition of the rider's weight.

When the horse breaks into the increased gait, many riders, instead of leaning forward (going with the horse), depend upon the cantle to catch the buttocks while the trunk goes backward and the hands fly up, with the result the horse is hit on the mouth and the rider is behind the horse, i.e., he is out of balance with the horse which is also off balance because his head is in the air and he is "behind the bit." On the other hand, it is a pleasure to watch the relaxation displayed by the horse under a good polo trainer or a top calf roper because *there is no anticipation of a crack on the mouth.* Feel the tender bars of a horse's mouth (between the front and back teeth of the lower jaw) and you will want to shoot the first fourth-rate rodeo hand whom you see push against the cantle and rear back on his horse's mouth with all his might. If the rider will sit down in his saddle; go with his horse; relax his fingers, wrists, elbows and shoulders; lower his hands into a natural position; use the bit humanely (intermittently) and use his legs, not his spurs, to give the horse an indication that he is about to ask a change of gait or direction, training for handiness will be accomplished more quickly and effectively and will result in good head and neck carriage, proper haunch placement and fewer horses with unpleasant dispositions.

Power-Charged Barriers

Condensed from The Cattleman

Fred N. Ares
Superintendent, Jornada Experimental Range

ELECTRIC fences have shown considerable promise as a means of controlling the distribution of livestock on the range. Tests with electric fences on the Jornada Experimental Range have indicated that this type of fence can be very effectively used under certain range conditions but that some improvements will have to be made in the electrical equipment if it is to be universally successful under all conditions.

In August, 1938, 3½ miles of one-wire fence were constructed around one of the large tobosa flats on the Jornada for the purpose of holding cattle on the tobosa summer feed and at the same time protecting the surrounding grama grass from heavy use during the growing season.

Following the heavy rains in July, the tobosa grass was green and succulent, and when the fence was built, the soil was very damp. However, before the electrical unit ordered arrived, the soil had dried out thoroughly, and the first results on this dry soil were disappointing. About 140 yearling heifers were placed inside the enclosure, and at first they passed back and forth under the wire freely. After about 3 days a light shower fell wetting the ground to a depth of about one-half inch, and following this there was no more passing back and forth under or even approaching the charged wire. A trail in the moist sand inside showed that the animals never came closer than 4 feet of the wire, salt placed near the line was approached with extreme caution and from one side only.

As a trial, the yearlings were kept in the enclosure about three weeks during which time none escaped. The wire was then taken down, and the yearlings had to be driven out of the enclosure. It is believed that none would have voluntarily passed between any of the standing posts even after the wire had been let down, at least not for some time afterwards.

During the 1939 season, rainfall was so deficient on the area fenced in 1938 that it was not possible to use it for further tests, but a smaller pasture was constructed where water and feed were available. It was stocked with a small herd of cattle and

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functioned very satisfactorily after the soil become moist.

A further test to determine the value of the electric fence in segregating poison plant areas was carried out this year. A heavy infestation of the poisonous drymaria was found near the south boundary, and being adjacent to the fence, it was possible to enclose a large area with only ¼ mile of fence. This proved to be very effective in keeping cattle away during the danger period.

The chief value of such an enclosure on ranges such as the Jornada seems to be that of holding cattle on summer feed especially where such feed areas are intermingled with and sometimes entirely surrounded by range supporting grama grass which must be reserved for winter use. For this purpose these one-wire fences can be constructed quickly and cheaply and can be easily removed when no longer needed. Other uses suggested are: segregation of poison plant areas, holding non-breeding stock such as yearling heifers separate, and holding breeding cows and bulls together in an effort to increase the calf crop.

The cost of electric fences varies from $20 to $35 a mile, depending upon the length of fence built, type of post (metal or wooden), and type of electrical equipment used. The maintenance cost is very low. The electrical current may be supplied by an ordinary 6-volt auto storage battery which will run 4 to 5 months before it is necessary to recharge. The wire must be well insulated from contact with the ground and patrolled frequently, especially when first used, to repair any short circuits or ground. The better control units have a device by which grounds are indicated at the control box. Electric fences have been rather universally successful wherever soil moisture conditions are such as to insure a good electrical contact. They should work out successfully on Southwestern ranges if the difficulties of making satisfactory contacts on dry soils can be overcome. It is expected that some improvement can be made in the electrical equipment which will increase the effectiveness of the electric fence under dry soil conditions. Also it has been found that if the livestock become "educated" to the electric fence, they will respect it from then on. This educational training can be accomplished by holding livestock in small enclosure with an electric fence, or it may be accomplished by erecting the fence on the range when the soil is moist. This latter method is probably much more practical as far as range operations are concerned.

. . . and So They Hired Themselves

Condensed from Pacific Rural Press

D. M. Rutherford

THIS little story is dedicated to those who think that opportunity is a dead Indian.

Three years ago James Lawless and Lowell Martin graduated from the University of Southern California, facing a jobless world which did not bow low before the magnificence of a college diploma. So they tossed the sheepskins aside and looked for opportunities. After some months of looking into blind alleys they thought there might be something for them in the rapidly expanding business of preserving foods by freezing.

James and Lowell called at the USDA Fruit and Vegetable Chemistry Laboratory in Los Angeles and interviewed E. M. Chace and D. G. Sorber. They were given a picture of what was going on in the industry. The next day they came back with a lot of questions. Three weeks later they telephoned Chace and Sorber: "Come over and see us. We are in business."

That was two years ago. Now these young men are well established in a small but healthy business making fresh frozen fruit purees for the ice cream trade. They are represented by nine brokers in various parts of the country and devote their energies to supervising the preparation and freezing of the fruit purees. During the past season they had as many as 35 employees in their plant, and have frozen and sold a large volume of fruit.

Purees—the pulp and all the juice of fruits without the seeds, pits and skin—of the following fruits and berries are quick frozen for the trade: Royal Apricot, Concord Grape, Stanwick Nectarine, Rio Oso Peach, Persimmon, Santa Rosa Plum, Blackberry, Boysenberry, Black Raspberry, Red Raspberry, Klondike Strawberry, Youngberry.

These frozen purees can be used wherever fruit flavors have been employed in the past in ice cream, sherbets, fruit punches and novelties. Experiments are now being made with small packs of sliced and crushed fruits as well as tangerine and guava puree, and pomegranate juice. A variety of cherry which would keep its color in the process of freezing and mixing into frozen products would be welcome.

The products are packed in

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gallon and 33 pound tins for freezing. Fruits are selected for quality and are not picked until full ripe. Then they are hurried to the plant, inspected, precooled, thoroughly washed, pureed, sugar added, and frozen, never taking more than 10 hours between tree and freezer. Tests by the new "Standard Method" indicate surprisingly low yeast and bacterial counts. Lacquered tins which are vacuum closed are used, and the purees frozen in an air blast at 30 degrees below zero; stored at zero.

Thus fresh fruit sherbets and ice creams are available throughout the year. Boysenberry sherbet has proved to be very popular and is now a standard year-around item in most ice cream plants. With the availability of fresh fruit purees the consumption of fresh sherbets in the Los Angeles area has increased over 10 per cent in a short time. People like the fresh full ripe fruit flavors.

It is expected that these frozen fruit products will eventually be sold at retail, to be stored in frozen food lockers or home refrigerators having freezing compartments. Housewives may find them desirable for use in making ices, jams, jellies and fruit drinks.

To the trade the frozen purees have the following advantages: Can be employed in any formula; fresh fruit is available free of seeds, pits, skin; throughout the year; consumers like the variety of fresh fruit flavors; increased food and vitamin values; labeling advantages under the new Pure Food and Drug Act.

This method of preservation and distribution of fruits should be effective in increasing the consumption of California fruits. It would appear that Lawless and Martin have started something very much worth while. And they have made jobs for themselves.

For the Farmer's Library

These books are recommended as outstanding in their field:

Beef Cattle—By Roscoe R. Snapp, Asso. Prof. Animal Husbandry, Univ. of Illinois. John Wiley & Son, Inc. $4.00.

(See Farmers Digest, November, 1939)

Dairy Cattle and Milk Production—By Clarence H. Eckles, B.S.A., D.Sc., late Chief, Div. of Dairy Husbandry, Univ. of Minnesota. Macmillan Company. $3.60.

(See Farmers Digest, February, 1940)

Feeds and Feeding—By F. B. Morrison, Prof. of Animal Husbandry and Animal Nutrition, head of the Animal Dept., Cornell Univ. Morrison Press. $5.00.

(See Farmers Digest, October, 1939)

Farm Meats—By M. D. Helser, B.S.A., M.S., Prof. Animal Husbandry, Iowa State College. Macmillan Co. $2.90.

(See Farmers Digest, January, 1940)

Poultry Husbandry—By Morley A. Jull, Prof. of Poultry Husbandry, Univ. of Maryland. McGraw, Hill & Co. $4.00.

(See Farmers Digest, July, 1939)

Pork Production—By William W. Smith, Prof. of Animal Husbandry, Purdue Univ. Macmillan Co. $3.75.

(See Farmers Digest, September, 1939)

Vegetable Growing—By James Edward Knott, Ph.D., Research Prof. Vegetable Growing, Cornell Univ. Lea & Febriger. $3.25.

(See Farmers Digest, April, 1940)

For the convenience of our readers, books listed may be purchased through this Department. Address C. Leavitt Dyer, Farmers Digest, Ambler, Pa.

Soil Conservation Bulletins

To Hold This Soil
Miscellaneous Publication No. 321, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 45c

Terracing for Soil and Water Conservation
Farmers' Bulletin No. 1789, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

What is Soil Erosion?
Miscellaneous Publication No. 286, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Strip Cropping for Soil Conservation
Farmers' Bulletin No. 1776, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

The Land in Flood Control
Miscellaneous Publication No. 331, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Conservation Farming Practices and Flood Control
Miscellaneous Publication No. 253, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil-depleting, Soil-conserving and Soil-building Crops
Leaflet No. 165, Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Soil Conservation Districts for Erosion Control
Miscellaneous Publication No. 293, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 10c

Soil Defense in the Northeast
Farmers' Bulletin No. 1810, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 15c

Erosion on Roads and Adjacent Lands
Leaflet No. 164, U. S. Department of Agriculture
For sale by the Supt. of Documents, Washington, D. C. Price 5c

Are They Vermin?

E. Laurence Palmer

Prof. of Rural Education, Cornell University

GOSHAWK

Astur atricapillus atricapillus

(Wilson)

Description — Black-crowned, slateblue. Length, nearly 2 feet; wing spread, 44½ inches; weight, up to 4 pounds, the female larger. Tail, white-tipped; wings, 4 or 5 dark bands. Young, dark brown instead of slateblue above and streaked beneath.

Where found—In wild woodlands and fortunately not common.

Range—Breeds from northwest Alaska to northern Ungava and south to New Mexico and Pennsylvania. Winters in southern part of summer range and south to Virginia.

Relations and life history—One of the Accipiters, related to sharp-shinned and Cooper's hawks. Breeds in large forests. Nest in a tree, a large pile of sticks; 3 to 5 white or pale-blue eggs, 2.3 by 1.7 inches; hatch in about 28 days into blind and helpless young which eat animal matter from the first. One brood a year. Call a shrill "kwee-kwee-kwee."

Behavior—Of 881 stomachs, 441 contained poultry and game; 233, mammals; 49, other birds. Usually waits in some tree or thicket, where they are inconspicuous, to fly into open in a sudden attack on prey. Often gets its prey so quickly that it is not detected and the blame is placed on high-soaring species.

Reaction to heat, light, and moisture—Active in daytime. Moves into breeding area in March and leaves it in October sometimes in flocks. In New York appears as a winter visitant. Assumes adult plumage when 1½ years old.

Relation to man's interests—Probably the most destructive hawk. With $5 bounty Pennsylvania killed 80 in 1929, 120 in 1934-35, and 700 in 1935-36, so bounty was not effective. Name implies "goose" hawk. Protected in 10 States but not in New York.

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